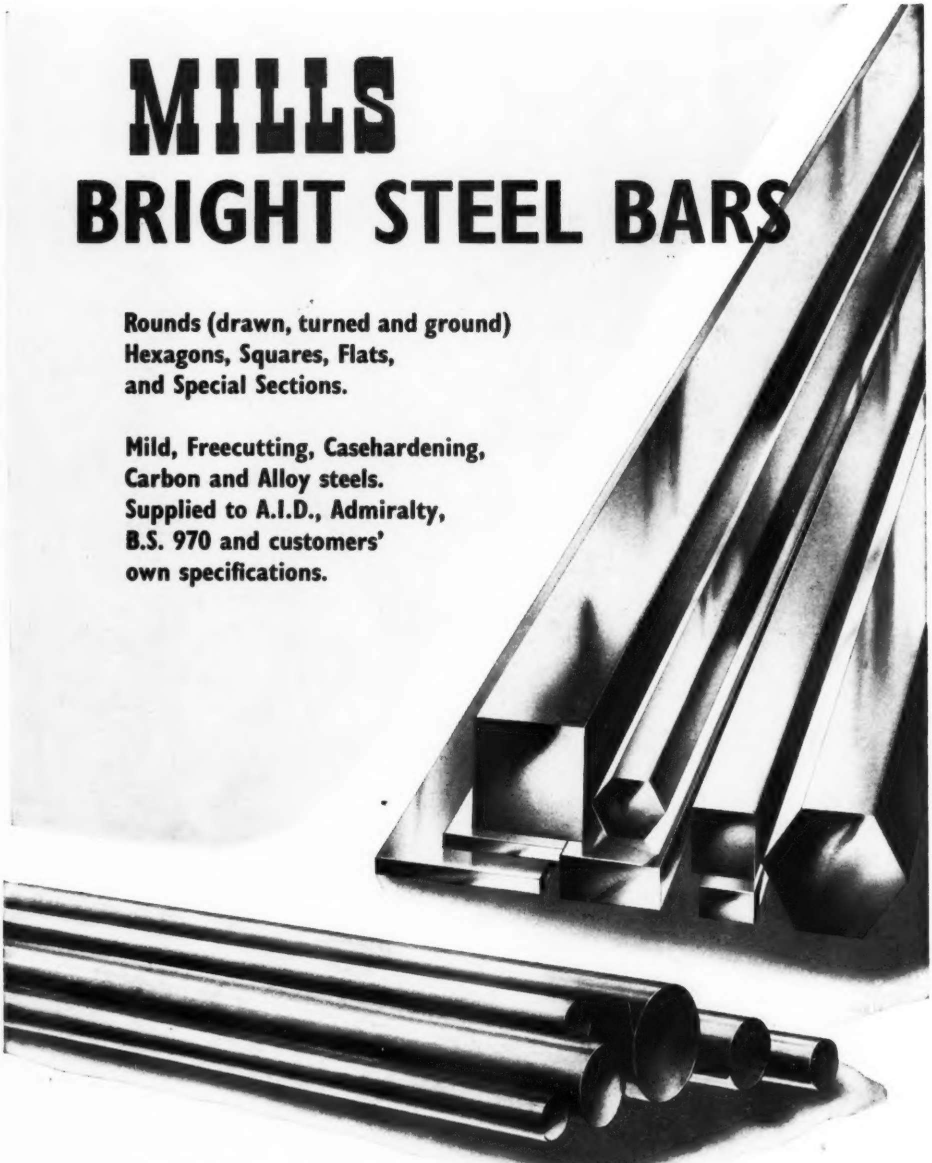
MACHINERY

FEBRUARY 1, 1961

ONE SHILLING & THREEPENCE



When answering advertisements kindly mention MACHINERY.

noon...

. . . and last night's

FONDU CONCRETE

will carry the load

In fact, you will be well on the safe side because, for most jobs, work carried out with FONDU concrete is ready even earlier. For machine foundations, floor, road and factory entrance repairs and renewals CIMENT FONDU is unequalled. Concrete made with CIMENT FONDU in many cases, is ready for use 12 to 15 hours after placing, dependant upon the loading, but all CIMENT FONDU concrete is rock hard and will take any load at 24 hours. CIMENT FONDU can save you time and money on your concrete work by eliminating waiting time. Also, used with suitable aggregates, CIMENT FONDU produces Refractory and Insulating concretes of the very highest quality.

Let us send you our 32-page booklet "THE CEMENT FOR INDUSTRY".

CIMENT FONDU
Regd Trade Mark
ALUMINOUS CEMENT

The Cement for Industry

FOR SPEED · STRENGTH · RESISTANCE · REFRACTORINESS

LAFARGE ALUMINOUS CEMENT CO. LTD. 73 Brook Street, London, W.1. Tel: MAYfair 8546

AP 98a

Here is real protection from start to finish

With RODOL, your product is proof against rust damage during the whole of its journey from the stock shed, through the press shop and the paint shop to the packing bay. Inter-process protection is essential if losses through rust damage are to be avoided and RODOL is available in several grades to give different degrees of protection required. RODOL can be applied by dipping, spray or brush in either full-drying, semi-drying or non-drying types. Write for samples and literature.

use

RODOL

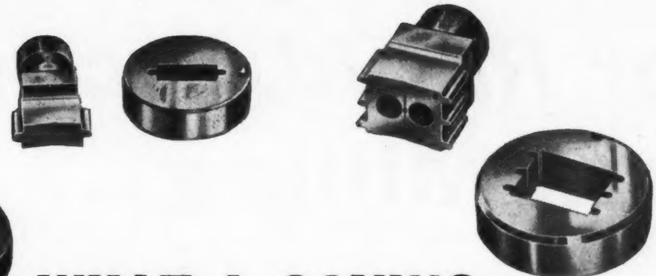
against rust

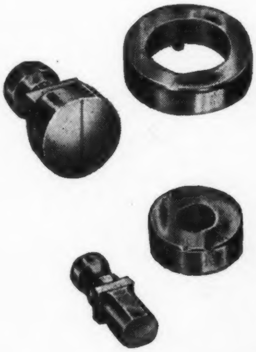
FLETCHER MILLER LTD., ALMA MILLS, HYDE, CHESHIRE.

Telephone: HYDE 3471 (5 LINES) · *Telegrams:* EMULSION, HYDE

Also at LONDON, WEST BROMWICH, NEWCASTLE-ON-TYNE, CARDIFF, GLASGOW AND BELFAST

R46





WHAT A SAVING on Short and Medium Run Piercing Jobs!

BRITISH WIEDEMANN Tooling

Rounds, squares, ovals, clusters and shapes — you use the same tools for every piercing job with similar openings. Every tool is ready for instant use: no setting—always in accurate alignment. The Wiedemann method saves time and expense in other ways, too — reducing handling and eliminating marking out and hand finishing. So why delay longer? Find out more about this economical method today.

There's a WIEDEMANN Turret Punch Press for every short and medium run piercing job.

Hand or power—15,000 to 160,000 lb. punching pressure.

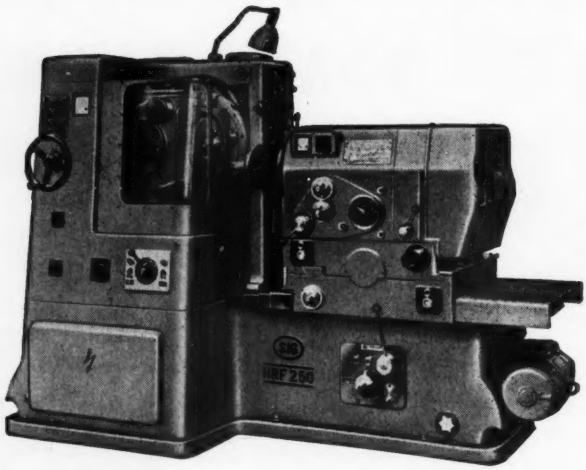
Send for new illustrated brochure

DOWDING & DOLL LTD

346 KENSINGTON HIGH STREET, LONDON, W.14

Tel: WESTERN 8077 (8 lines) Telex: 23182 Grams: ACCURATOOL LONDON TELEX

For *Rapid* Accurate Cam Milling...



SWISS S.I.G.

HYDRAULIC CAM MILLER MODEL HRF 250

All types of cams can be copied accurately, rapidly, economically from simple sheet steel templates on the S.I.G. Cam Miller. Plate, track, face and special cams can be copied—cylindrical cams can be copied—besides irregular forms, and worms up to 8 convolutions of constant or varying pitch. An attachment is available for grinding hardened cams. Special features include stepless drive to the face plate by S.I.G. hydraulic motor and to the cutter spindle by P.I.V. gear.

Maximum diameter: Plate cams 12", cylindrical cams 14".
Maximum height, cylindrical cams 10". Cutter spindle speeds (13) 100 to 1600 r.p.m.
Face plate speeds, stepless ·016" to 2 r.p.m. Grinding wheel speeds 15,000 or 24,000 r.p.m.

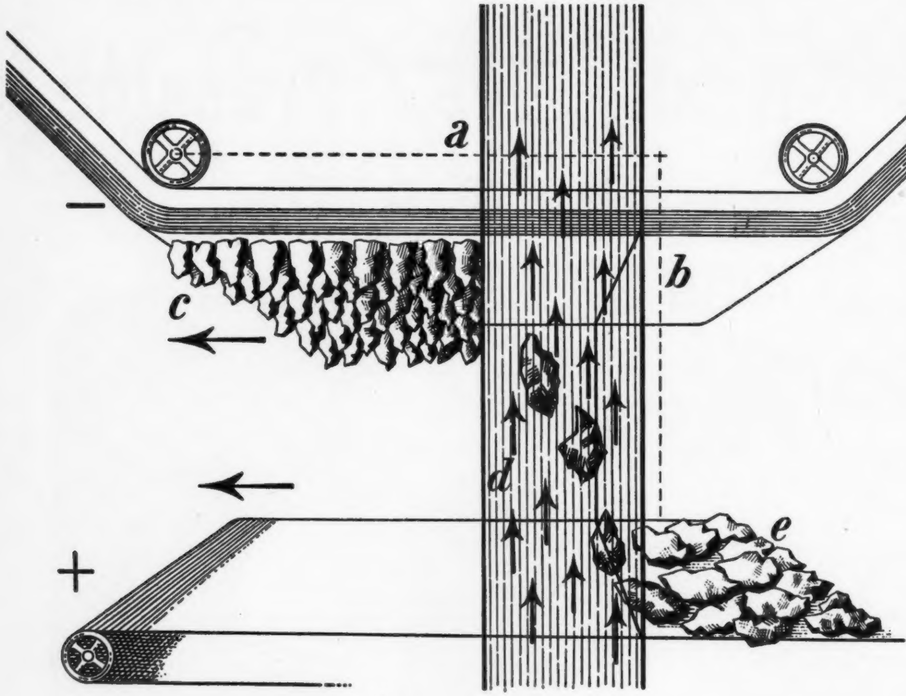
Send for brochure M/210 to the Sole U.K. Distributors:

DOWDING & DOLL LTD

346 KENSINGTON HIGH STREET, LONDON, W.14

Tel: WESTERN 8077 (8 lines) Telex: 23182 Grams: ACCURATOOL LONDON TELEX

210



a cut above the rest?

YES a million cuts! And here's why

Every razor-edged grain in EAC abrasives stands bolt upright, presenting maximum cutting power to the work in hand. The grit, orientated on its longitudinal axis, is shot arrow-like into the adhesive by electrostatic force. That's why EAC abrasives literally bristle with cutting edges, work faster and last longer than ordinary makes. There's the right EAC abrasive for every operation. Insist on EAC for the best of good reasons—it saves money!

"BRITANNIA" EAC ENGLISH ABRASIVES CORPORATION LTD "JOHN BULL"

coated abrasives

ENGLISH ABRASIVES CORPORATION LIMITED

Marsh Lane, Tottenham, London, N.17. Telephone: Tottenham 5057

Subsidiaries Thos. Goldsworthy & Sons Ltd. The Helvetia Abrasives Co. Ltd. London Abrasives Ltd.

B11/5

Fo

Scre
2¾" (
Wh

High
1" x
Wh
Lim
Gri

Thr
3" d
Am

Mic
10m
long
Gri

Inte
Eng
1¾"
Wh
Gri

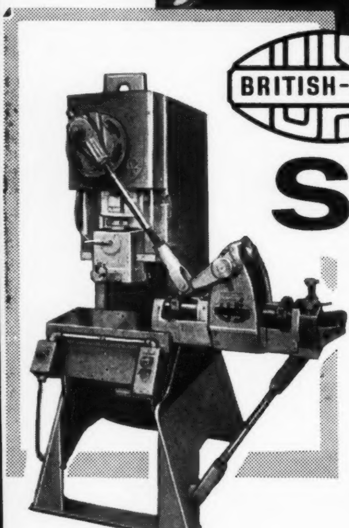
ALS

M

REDUCE SET-UP TIMES

with the improved

BRITISH-BUILT



SLIDE FEED

EASE OF ADJUSTMENT

No connecting rod adjustments required when changing feed lengths.

SYMMETRICAL DESIGN

Feed block operates from centre. Front and rear stops adjustable.

FEED-LENGTH INDICATOR

Attached to feed body. Allows quick check of feed length. Eccentric is simply adjusted so that indicator points to desired length on scale.

MACHINED PAD ON SIDE BRACKET

for alignment with die.

SIMPLE ADJUSTMENT FOR STOCK THICKNESS

Model No.	Max. Width of Stock	Max. Length of Feed	Max. Stock Thickness
SF-68A	6″	$8\frac{1}{4}$″	$\frac{1}{8}$″
SF-99A	9″	$9\frac{1}{4}$″	$\frac{1}{8}$″

For further particulars write or telephone TODAY

ROCKWELL
MACHINE TOOL CO. LTD.

WELSH HARP, EDGWARE RD., LONDON, N.W.2. TEL: GLADSTONE 0033

LSO AT BIRMINGHAM—TEL: SPRINGFIELD 1134/5 · STOCKPORT—TEL: STOCKPORT 5241 · GLASGOW—TEL: MERRYLEE 2822

PR16

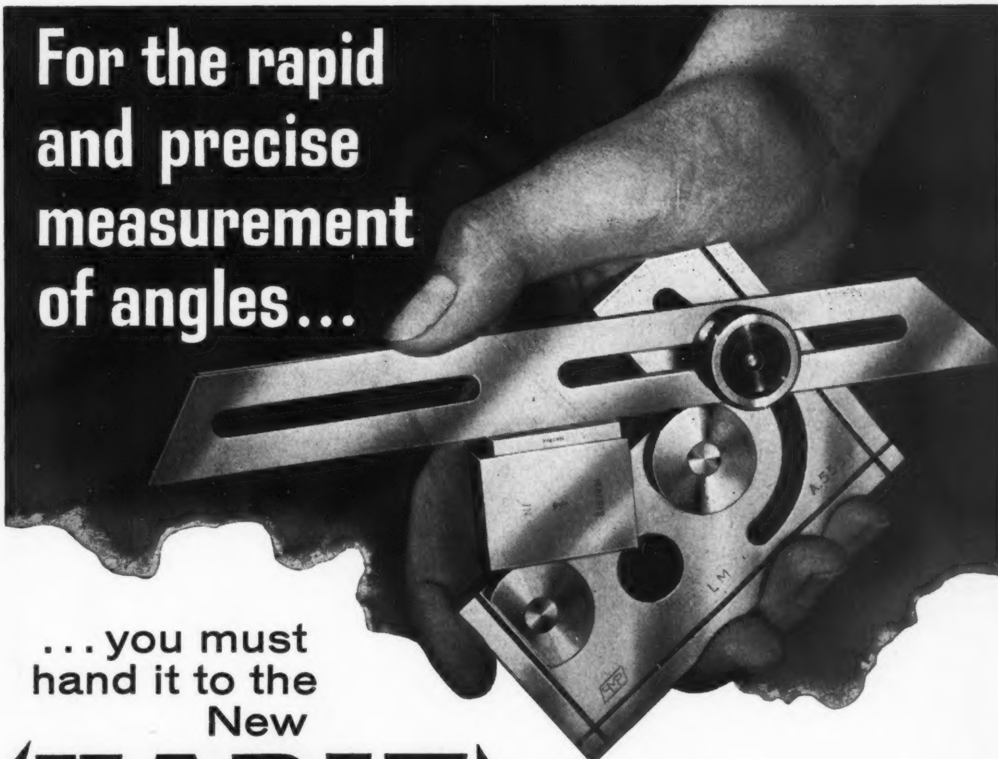
Fel

I

A

A

U.S
Tecl
BUF
tieb
(Jol



... you must
hand it to the
New

'HABIT'
SINE PROTRACTOR

- PRECISE · SIMPLE · VERSATILE
- CUTS COST OF REJECTS
- SPEEDS UP SETTINGS AND INSPECTION

Indispensable to toolmakers and inspectors for instant and accurate inspection of angles.

The Habit Sine Protractor, made of hardened stainless steel, ground and lapped on all surfaces, consists of a master set square fitted with two rollers with 2" centre distance guaranteed to 2 microns and a swivelling rule pivoting through 180° in the plane of the roll centres. Angles to an accuracy of ± 15 seconds, can be built from 0°—180° by using slip guages.

A really dependable reference.

MAKE IT A 'HABIT' TO BE ACCURATE

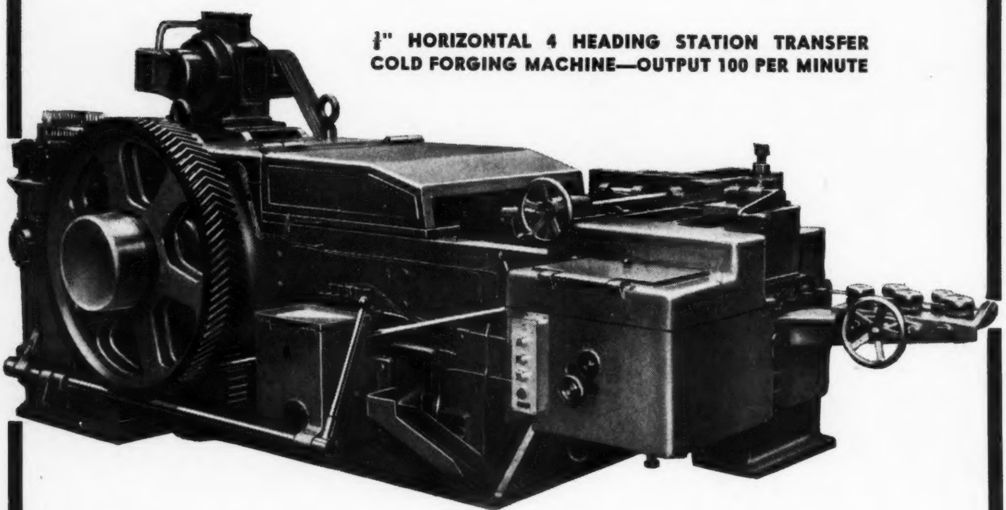
HABIT GEOMETRIC TOOLING

LURGAN AVENUE, LONDON, W.6 · TELEPHONE FULHAM 7944

Telegrams HABIT , LONDON, W.6

GREENBAT COLD FORGING MACHINERY

$\frac{3}{8}$" HORIZONTAL 4 HEADING STATION TRANSFER COLD FORGING MACHINE—OUTPUT 100 PER MINUTE



This $\frac{3}{8}$" Horizontal 4-station transfer Cold Forging Machine has an output of 100 per minute. It will cut off lengths of $4\frac{1}{2}$" with a cut-off capacity of 9/16" diam. on high tensile steel wire. Special features include the punch and die ejectors, fitted with electrical safety devices so that in the event of a tooling failure the machine is stopped almost instantaneously by motor plug brakes working in conjunction with a powerful band brake. The machine is fully automatically lubricated and can be supplied with a variable speed drive.

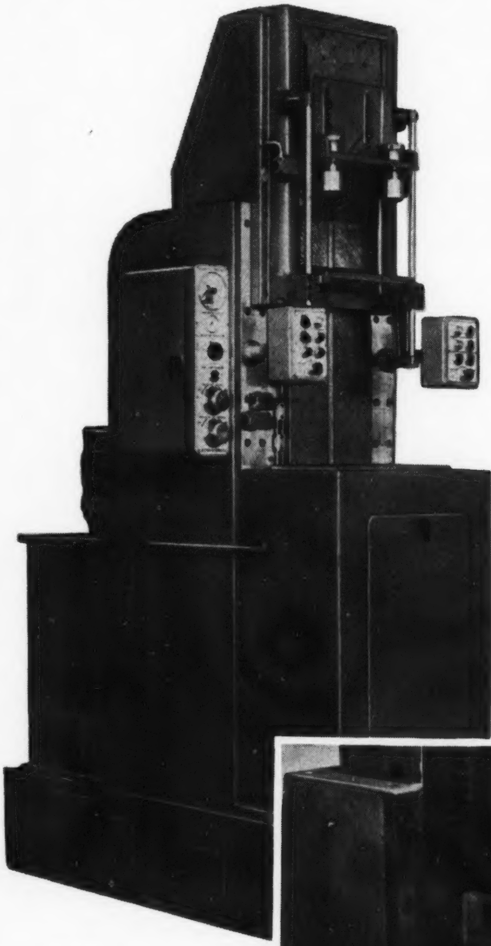
Also available is a complete range of standard and high speed, single and double blow, open and solid die cold forging machines; reheading and trimming machines; thread rolling machines, etc.

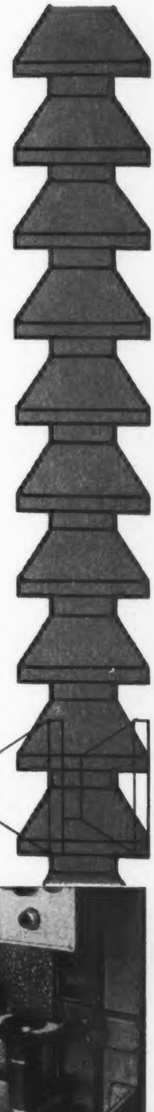
Advice willing given on any manufacturing problems connected with cold or hot forging.

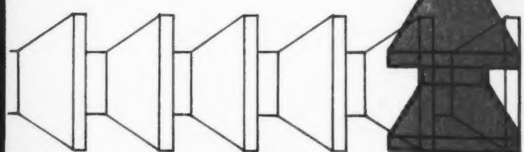
GREENWOOD & BATLEY LTD.

ALBION WORKS LEEDS ENGLAND

varinelli HORIZONTAL & VERTICAL BROACHING MACHINES



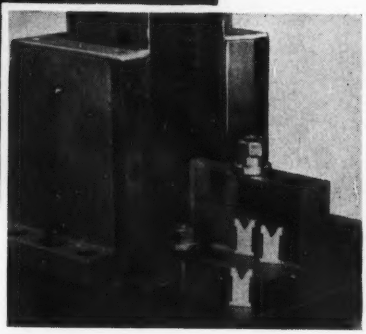


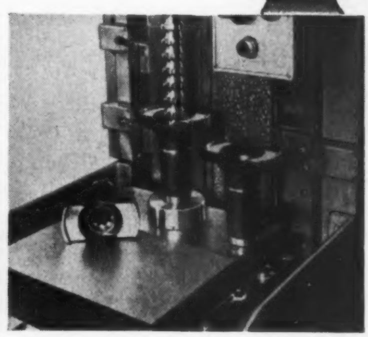


FOR INTERNAL AND EXTERNAL WORK

These hydraulically operated machines are available in a range of sizes.

Machines built for special requirements.





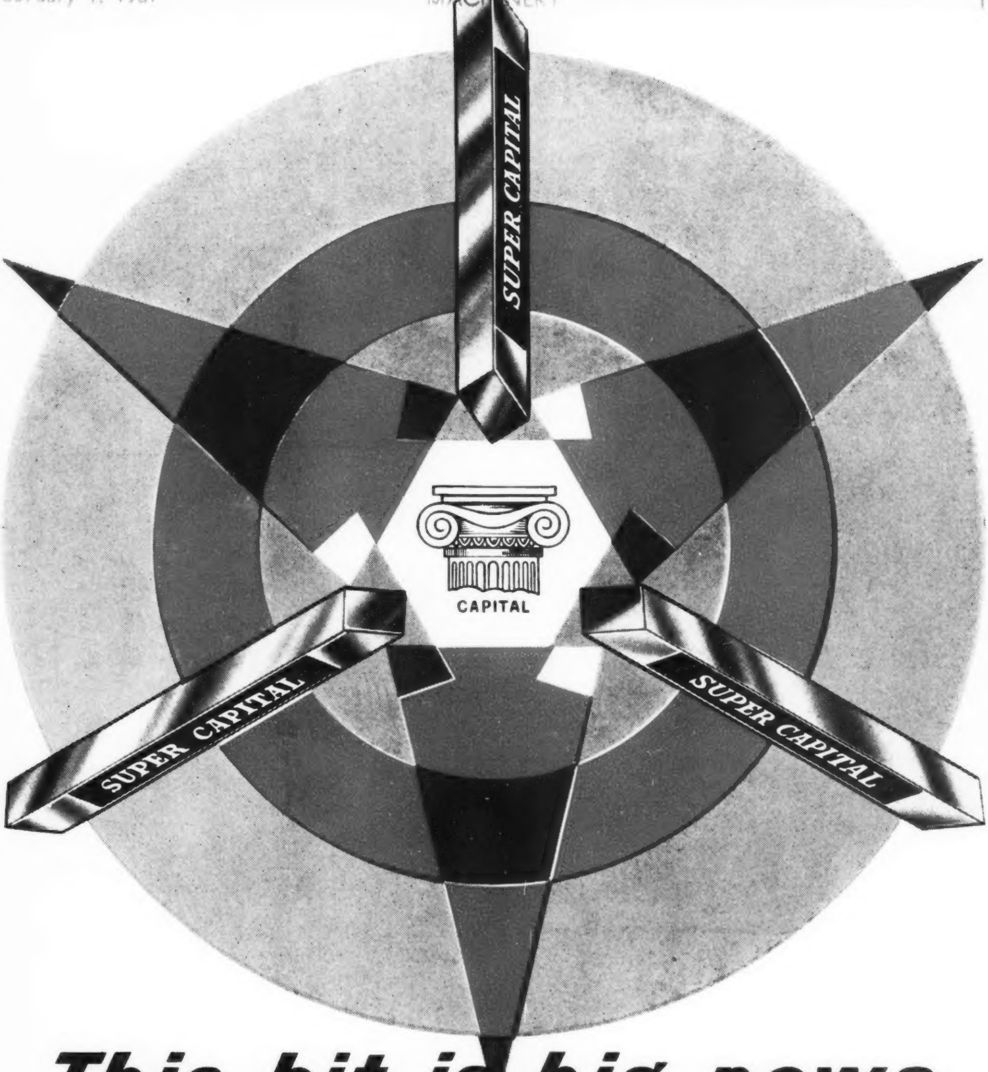
EARLY DELIVERY

EXCLUSIVE DISTRIBUTORS IN THE UNITED KINGDOM

ELGAR MACHINE TOOL COMPANY LIMITED

172-178 VICTORIA ROAD · ACTON · LONDON W3 · Telephone ACORN 5555
MIDLANDS SHOWROOM: 1075 KINGSBURY ROAD, ERDINGTON, BIRMINGHAM 24. Tel: Castle Bromwich 3781/2
SOLE SCOTTISH AGENTS: ANGUS & CRICHTON (SALES) LTD., 7 MIDLAND STREET, GLASGOW C.I. TELEPHONE: CITY 4560

NRP 3347



This bit is big news
– from any point of view

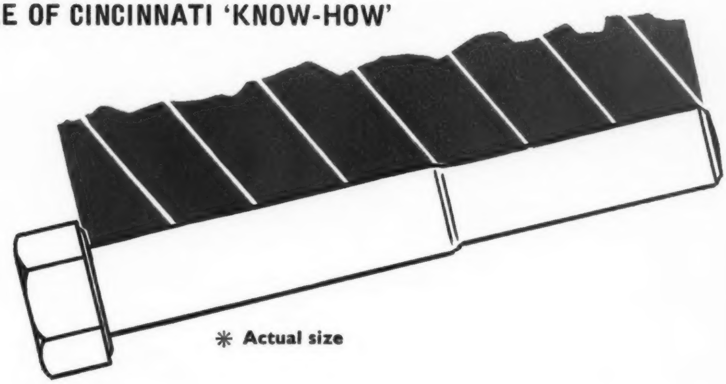
There are sound reasons for using "Super Capital" High Speed Steel Toolbits. The high quality steel is production controlled and tested, in Balfour's own works, from the melt to the finished product.
Toolbits are subjected to a specialised heat treatment to ensure extra life and durability They satisfy the needs of users who require maximum performance at no extra cost. These qualities ensure that a change to "Super Capital" is a change for the best. Available in Sheffield and also from branch office stocks in London, Birmingham, Manchester and Cardiff.

ARTHUR BALFOUR

ARTHUR BALFOUR & CO, LTD. CAPITAL STEEL WORKS, SHEFFIELD ENGLAND.
ASSOCIATED COMPANY: THE EAGLE & GLOBE STEEL CO. LTD.

CENTRELESS GRINDS 325 SET SCREWS EVERY HOUR

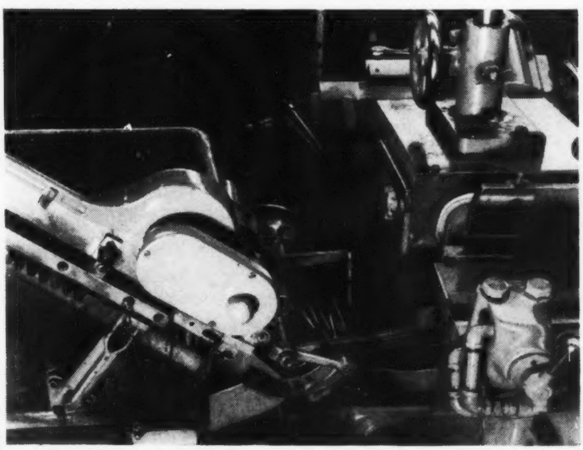
A TYPICAL EXAMPLE OF CINCINNATI 'KNOW-HOW'



* Actual size

PRODUCTION DATA

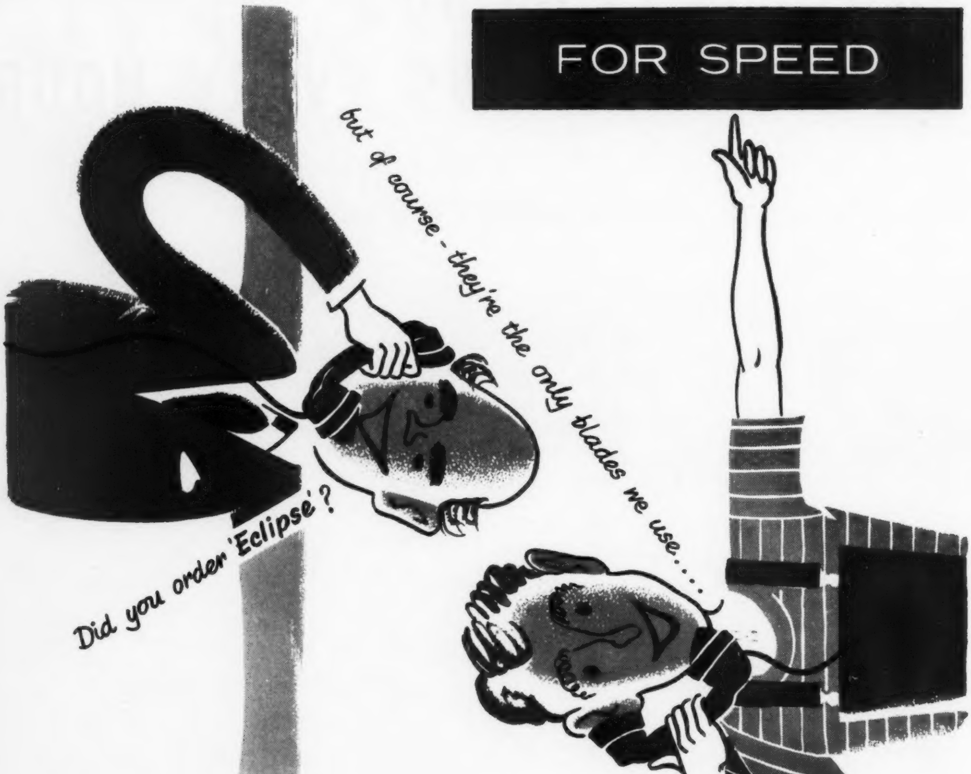
	per M/c
Stock removed	0.008/0.010 ins. on diameter
Tolerance & Finish	Commercial
Prod./hour	325



Automatic Loading and Unloading allows production rate to be maintained at maximum limit.

Automatic Infeed Attachment maintains feed and dwell time at absolute minimum.

MACHINES LTD. BIRMINGHAM 24



'Eclipse' hacksaw blades and other tools are made by James Neill & Co. (Sheffield) Ltd. and are obtainable from all tool distributors.

UHSI

accurate

dependable

versatile

LINDNER

Optical Jig Borers

Optical measuring system does not depend on lead screws, gauge blocks, bars or limit switches—is permanently protected against mechanical wear. Only a light beam touches helically scribed cylindrical measuring scales which are independent of table movement mechanism and are immovable in axial direction.

Photo-electric optical centring device minimizes visual fatigue and errors in settings—permits initial and repeat settings guarantee accurate within 0·00015in. and readings in 0·00005in.

AUTOPOSITIONER enables operator to preselect table position for next hole while one boring operation is in progress—eliminates non-productive time between holes. As one hole is completed, table moves in rapid traverse to the next pre-selected position. (Available only on Model LB15A.)

Projection screen eliminates operator eye strain and bending—helical line from measuring scale is projected on 2¼in. by ¾in. screen which operator reads in standing position without eyepiece.

Automatic table clamping prevents errors in clamping and unclamping table between movements.

Model LB15A with AUTOPOSITIONER
Table size 44" x 24" (Illustrated
Model LB14 32" x 16"
(without AUTOPOSITIONER

SOLE AGENTS FOR GT. BRITAIN:

STEDALL MACHINE TOOL CO.

192-204 PENTONVILLE ROAD,
KINGS CROSS, LONDON, N.1

Telephone: Terminus 3699 Telegrams: Stedall, London, N.1

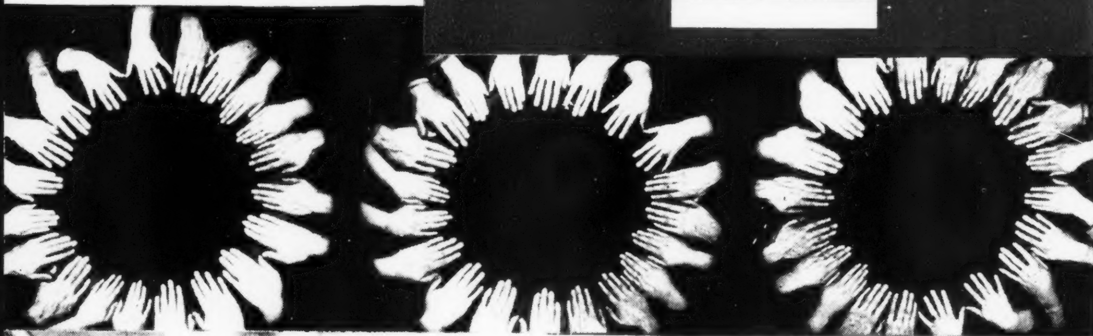
B*

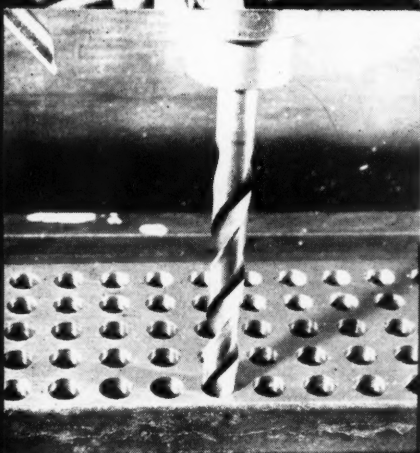

MACHINE TOOLS
PROCUNIER
the world's finest
TAPPING
EQUIPMENT
NOW AVAILABLE IN GREAT BRITAIN
* Precision built to highest standards.
* Assures accurate, dependable, sensitive tapping.
* Affords automatic tap protection.
BRITAIN'S FOREMOST DISTRIBUTORS
Monks & Crane Ltd
BIRMINGHAM · LONDON · MANCHESTER · GLASGOW
NEWCASTLE-ON-TYNE · LEEDS · BRISTOL

SM/MC 6174


H678/
Harper Castings are used
on
the
Bentley
these Harper Castings
are used in the gear box
and steering mechanism
on the Bentley 'S' Saloon
You are invited to send for Harper's latest illustrated booklet on Castings in grey iron, spheroidal graphite and Meehanite (Regd, trade mark); metal pressings, machining, enamelling and sub-assembly work.
On Lloyd's list for S.G. Iron Castings
CASTINGS WITH THE HARPER SKIN
FOUNDED 1790
HARPER Castings
JOHN HARPER & CO. LTD.
WILLENHALL · STAFFS · Phone: WILLENHALL 124 (5 lines)
LONDON, Phone: ABBey 5906/7
MANCHESTER, Phone: BLAckfriars 0295
POOLE FOUNDRY LTD. Phone: POOLE 212

DO YOU KNOW...





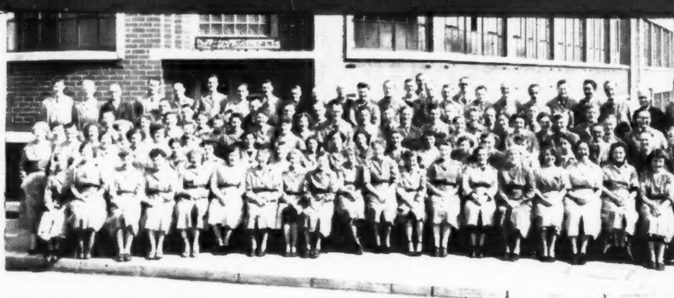
PRODUCTION It takes at least thirty people —thirty pairs of skilled hands—to make one DORMER Drill. Every operation is performed by experienced operators with the most up-to-date machinery. Careful heat-treatment and inspection are equally essential in maintaining the consistently high standard of DORMER Tools.

At least one in every ten people employed in the manufacture of DORMER Drills is an Inspector. Throughout production and before each DORMER Tool leaves the works, every feature is checked in minute detail.

INSPECTION

PERFORMANCE

With correct use, a DORMER Drill of 1in. diameter, in its lifetime on general purpose work, will remove 2,800 times its own weight in material (over $1\frac{3}{4}$ tons), and drill a total length of hole five hundred yards long!



DORMER TWIST DRILLS

THE FINEST BY ANY STANDARD

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED
SHEFFIELD ENGLAND

DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS

Feb

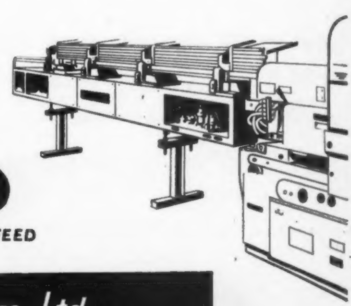
LIPE
BAR FEED

SPEEDS production at...

This leading manufacturer works accurately and fast — that's why he uses Lipe Bar Feed with fully automatic loading, feeding and ejection.

NUCKEY, SCOTT & CO. LTD

- Reloading time cut to *4 seconds*.
- Machine runs continuously — no time wasted.
- Absolutely reliable — one operator can handle several machines.
- 30% to 100% production increase.
- No feed fingers — feeds to LAST workpiece and ejects remnant automatically.
- There's a LIPE for most bar fed machines.
- Patented Rear Ejection gives positive control of remnant at all times.



LIPE ROLLWAY

FULLY AUTOMATIC MAGAZINE LOADING PNEUMATIC BAR FEED

Send for Data to Dept. M.3351
Patents Nos. 728898, 743461 and 827417

Automation Ltd.
DEVONSHIRE HOUSE VICARAGE CRESCENT LONDON S W 11
PHONE: BATTERSEA 5549

TAYLOR

NEW

AUTOMATIC SAWING MACHINE

Designed for automatically sawing off non-ferrous bars up to 2½" diameter with extreme rapidity, to dead length accuracy and with a clean cut surface.

Automatic magazine feed takes 10 foot bars which can be loaded by unskilled labour while machine is working.

Automatic ejection of last piece of bar.

Send for SECTION 19M Catalogue

CHARLES TAYLOR
BIRMINGHAM **LTD.**
BIRMINGHAM 5·ENGLAND

Telephone: MIDland 0083-4-5

DENHAM LATHES

for accuracy and ease of operation on small batch work

'OPERATABILITY' OF THE **SRIOV** LATHE ASSISTS WITTON-JAMES LTD.
TO TURN THIS 7FT. 6IN. SHAFT FOR A SPECIAL ELECTRIC MOTOR TO 19 DIFFERENT DIAMETERS

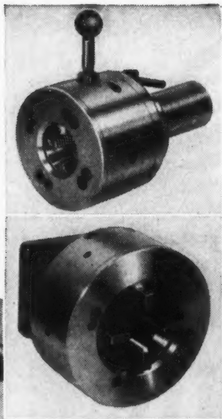
CENTRE LATHES FROM 17in. (430 mm) TO 42in. (1065 mm) SWING

SURFACING & BORING LATHES OF 17in. (430 mm) AND 25in. (635 mm) SWING

LATHES FOR SPECIAL PURPOSES/MATERIALS

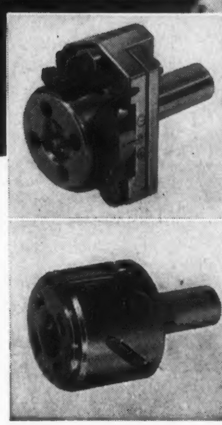
DENHAM'S ENGINEERING CO. LTD. HALIFAX, ENG.

Fe



the world's finest threading equipment —

COVENTRY DIEHEADS



A supreme range without equal; foremost in its field for nearly sixty years. Types available for rapid production; for use on spindles subject to rapid indexing; for use on stationary spindles and revolving spindles, with or without reverse; for cutting parallel or taper, short or long threads.

Self-opening Dieheads, 13 sizes, ¼" to 4½". Rotating Self-opening Dieheads, 11 sizes, ¼" to 3½". Solid Adjustable Dieheads, 8 sizes, ¼" to 3½".

1500 sizes and types of dies for cutting from commercial to precision threads, from the finest to coarsest pitch, standard or special forms, in all materials that can be threaded.

ALFRED HERBERT LTD., COVENTRY

AH

AD. 526

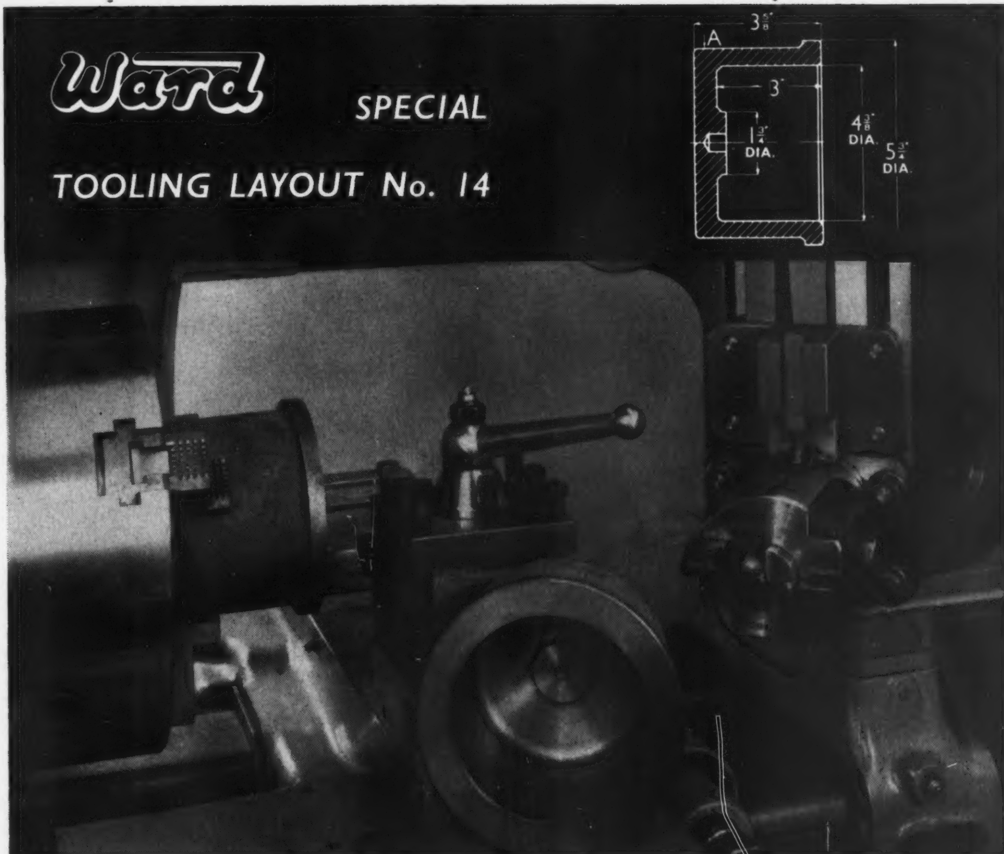

PARKSON
VERTICAL MILLER
2V
PARKSON
Capacity: 30 x 10 x 18$\frac{5}{8}$ in.
Power feeds and rapid traverse to all table movements
24 Spindle speeds:
18-1000 r p m
or 24-1330 r p m
or 27-1500 r p m
Spindle Nose: 5$\frac{1}{16}$ in. dia no. 50 taper hole
Range of
PARKSON
Horizontal Milling Machines
1NA Universal
2N Universal
2N Plain
3N Universal
3N Plain
Adapta Model N
J. PARKINSON & SON
(SHIPLEY) LTD
SHIPLEY Telephone 53231 YORKSHIRE
ABMTM
LTD

961

F

Ward SPECIAL

TOOLING LAYOUT No. 14



Floor to Floor Time :
2 mins. 45 sec.

7DS CAPSTAN LATHE
Code Word : **Sevends**
Fitted with 13" Air Operated 3-Jaw Chuck.

CAST IRON COVER
Tungsten Carbide Cutting Tools.

DESCRIPTION OF OPERATION	Tool Position		Spindle Speed R.P.M.	Max. Cutting Speed		Feed	
	Hex. Turret	Cross-Slide		Feet per min.	Metres per min.	Cuts per inch	m/m per rev.
1. Grip at A	—	—	—	—	—	—	—
2. Bore $4\frac{3}{8}''$ dia., face bottom, form end boss	—	—	—	—	—	—	—
and drill $\frac{3}{8}''$ dia. hole,	1	—	{177	278	84·8	76	·334
Turn flange dia.,	—	—	{119	180	54·7	Hand	Hand
Chamfer bore & flange	—	—	—	—	—	—	—
Finish face end	—	Rear	177	278	84·8	Hand	Hand
3. Remove from chuck	—	—	—	—	—	—	—

'PRELECTOR' Combination Turret Lathes with Preselective speed-changing.

TURRET LATHES with capacities up to 35 in. swing over bed

$1\frac{1}{2}$ in. to $2\frac{1}{2}$ in. 'D-S' DOUBLE-SLIDE Capstan Lathes for heavier accurate work.

Stock Tools, Toolholders, Chucks and Accessories for Capstan and Turret Lathes.

H. W. WARD & CO LTD
SELLY OAK, BIRMINGHAM 29
Phone : Selly Oak 1131

W. 687

DELIVERY AT WORKS RATES FROM STOCK

ring Nettlefold & Moser first

NETTLEFOLD & MOSER LTD., BOX 378, 170/194 BOROUGH HIGH STREET, LONDON S.E.1. PHONE: HOP 7111 (40 LINES)

NM41

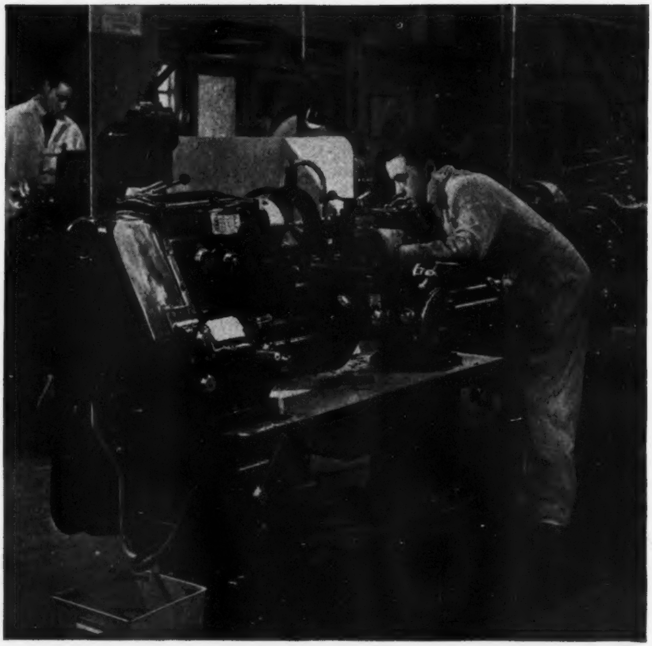
PRECISION . . .

wm

70

Junior

7" Centre Lathe



2 h.p. motor; 8 speeds 30-437 r.p.m., also alternatives: 44-640 r.p.m., and (when fitted with 2-speed motor) 30-437 r.p.m., sizes made to admit 45", 54" and 72" between centres.

An introduction to precision is given in the apprentice school at ROLLS ROYCE LTD., in keeping with the traditional concept from which their products have achieved fame. The machines selected for this specialised training include a number of 70 JUNIOR LATHES, which combine accuracy and productivity — characteristics which make them worthy of a place in the best workshops.

WOODHOUSE & MITCHELL

WAKEFIELD ROAD
BRIGHOUSE YORKS

PHONE :— BRIGHOUSE 627 (3 LINES)
GRAMS :— 'WOODHOUSE BRIGHOUSE'

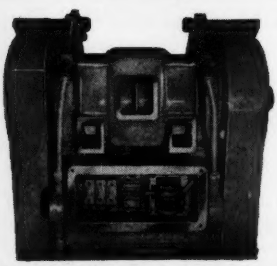
W.M. 30

THE NEW MURAD EG8 DUSTLESS GRINDER

- ***Filter Resistance Halved***
- ***Impeller Capacity Trebled***
- ***Eye Shields and Local Lighting***
- ***Now Standard***

These are some of the many improvements embodied in the new EG.8 making it without question the best off-hand Grinder in the world. The Murad Dustless Grinder is unique. It embodies its own dust inhibitor which offers protection to both worker and employer and makes the provision of a separate dust extraction plant unnecessary. It can be placed anywhere in the shop to suit the sequence of operations, even in close proximity to precision machines without endangering their slides. The repeat order is the finest tribute that a customer can pay to the efficiency and reliability of a machine tool. Britain's industrial giants have paid this tribute to the Murad Dustless Grinder.

Amongst many Users who send us a constant stream of repeat orders are such world-famous firms as Mullards, Pressed Steel, G.E.C., Atomic Energy Authority, B.T.H., British Oxygen, Gillette Industries, Skefko, etc., etc.



Control switchgear is designed into the machine and not added as an afterthought.

The above illustration shows the eyeshield swung up for ease in changing lamps, etc.

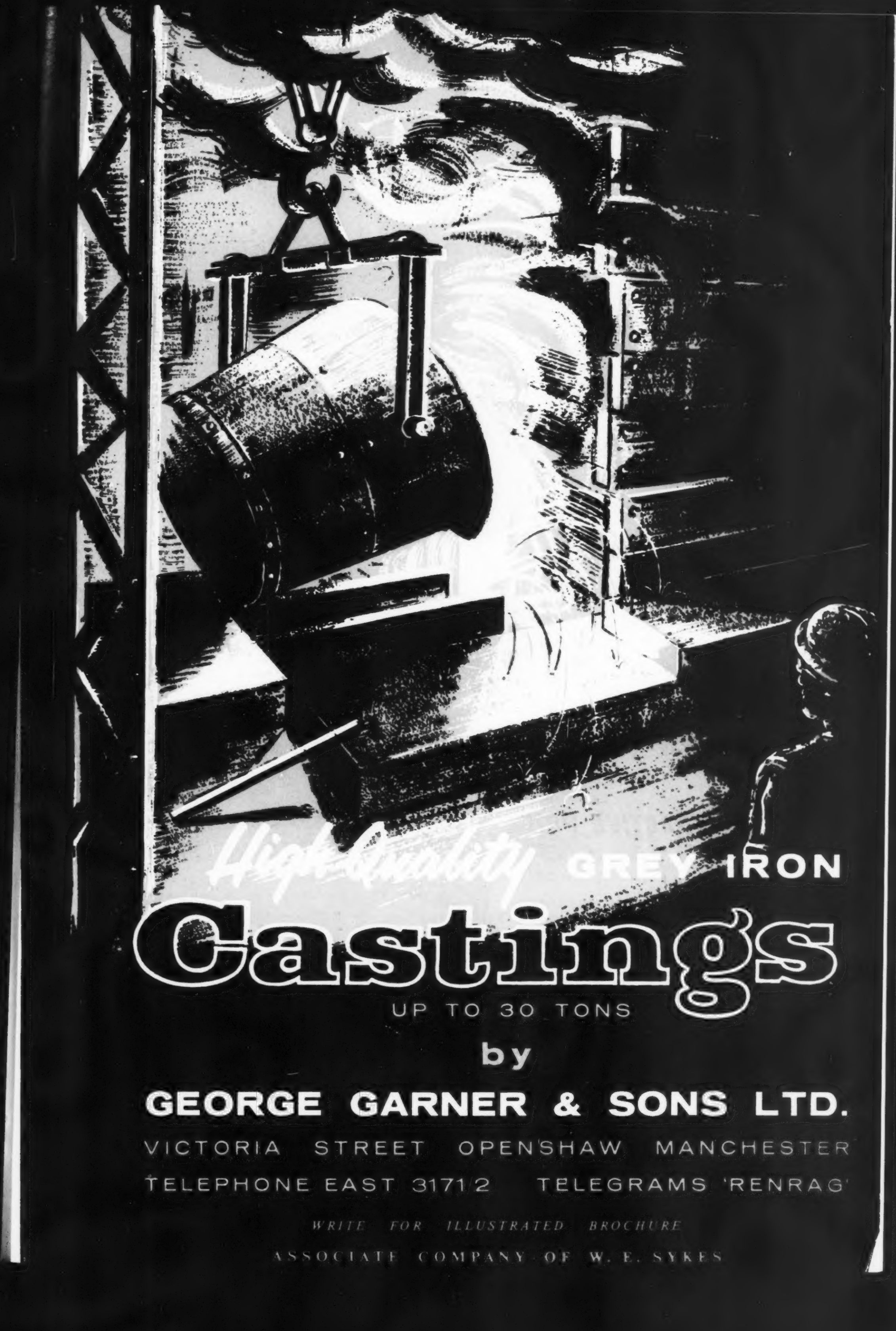
Pat. No. 674748

Murad DEVELOPMENTS LTD.

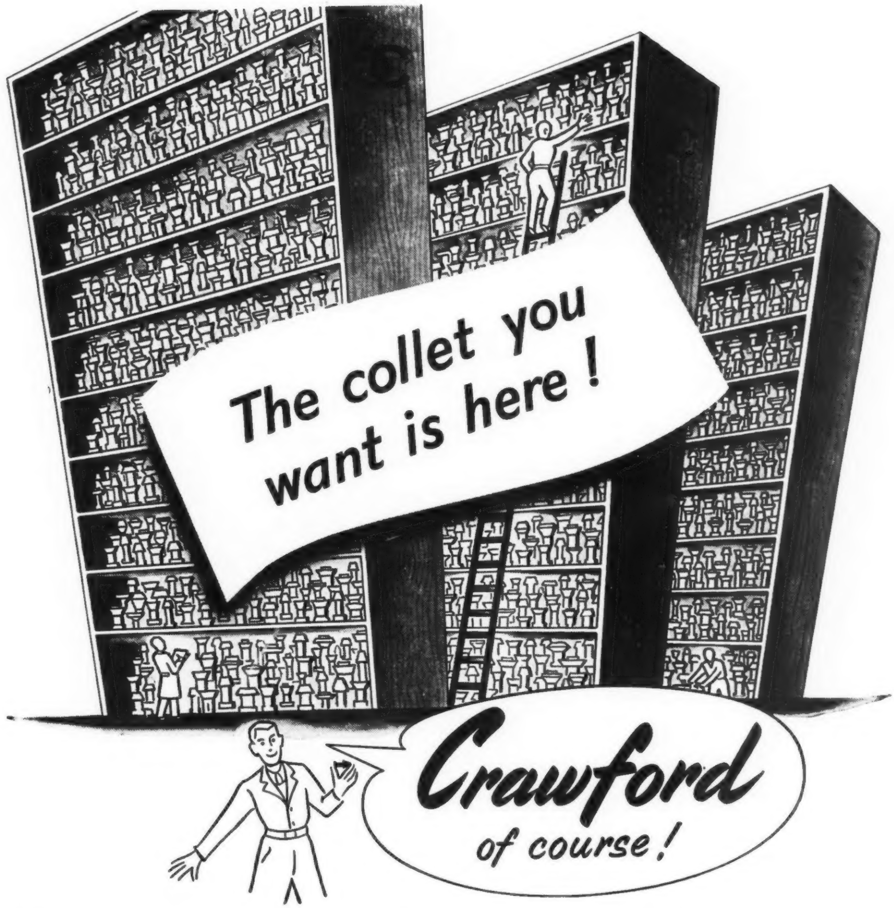
STOCKLAKE – AYLESBURY – BUCKS

TELEPHONE: AYLESBURY 2691 (4 LINES) CABLES: MURADITE, AYLESBURY

1961


High Quality GREY IRON
Castings
UP TO 30 TONS
by
GEORGE GARNER & SONS LTD.
VICTORIA STREET OPENSHAW MANCHESTER
TELEPHONE EAST 3171/2 TELEGRAMS 'RENRAG'
WRITE FOR ILLUSTRATED BROCHURE
ASSOCIATE COMPANY OF W. E. SYKES


OUTSTANDING PERFORMANCE
IMMEDIATE DELIVERY



All standard types in stock

. . for precision lathes, watchmakers lathes, milling machines, drilling machines, etc. Crawfords, specialists in collets for more than sixty years, can supply collets of every size and shape, all standard types being held in stock—and specials can always be made to your specifications. Write now for further details.

CRAWFORD COLLETS LIMITED

WITNEY . OXON . TELEPHONE WITNEY 334

London Stockists: Acbars Limited, 16-18, Macleod Street, Walworth Road, S.E.17. Tel: RODney 7191.
Midland & N W England Stockists: Retselp Engineering Ltd., Vulcan Road, Industrial Site, Lode Lane, Solihull, Birmingham. Tel: SOLihull 2239
Agents for North East England: Messrs. Alfred Herbert Ltd., Carliol Square, Newcastle, I. Tel: NEWcastle 28864
Agents for Scotland: R. McSkimming & Co., 65, West Regent Street, Glasgow, C.2. Tel: DOUglas 7391-2 C4


MEEHANITE
MEEHANITE
MEEHANITE
MEEHANITE

961

EVERY THREE

is FREE

The Speedicut "Chipbreaker" Drill operates at 50% to 400% higher feed rates, with the safety given by chip control. It will therefore drill at least three holes in the time normally taken for two.

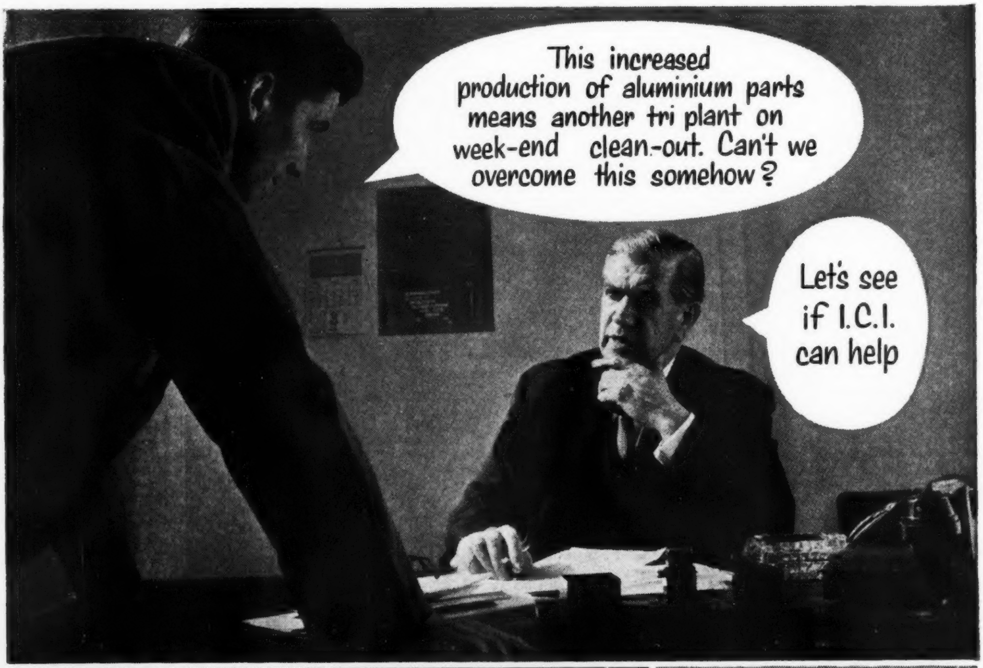
We can demonstrate this to you on your own equipment.

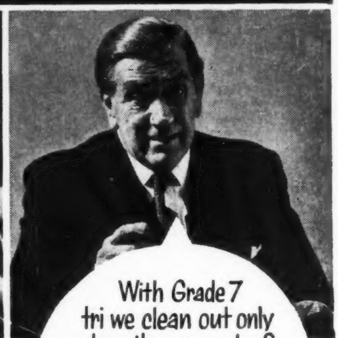
There are real savings here, particularly as you also get more holes between regrinds.

SPEEDICUT

"CHIPBREAKER" DRILLS

SPEEDICUT WORKS · CARLISLE STREET EAST · SHEFFIELD 4





I.C.I.'s rep. told us about a new I.C.I. solvent—Grade 7 trichloroethylene—that gives excellent protection against aluminium reaction.

We decided to tackle our problem by putting all plants dealing with aluminium on Grade 7 tri-which would mean less frequent clean-outs.

ICI GENERAL CHEMICALS DIVISION

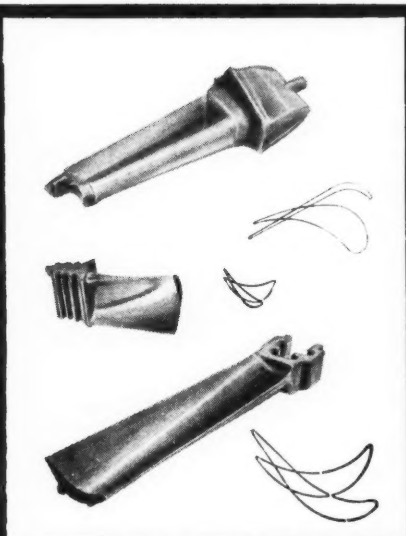
It pays to consult I.C.I. Metal Degreasing Service

IMPERIAL CHEMICAL INDUSTRIES LIMITED LONDON SW1

DP.267

Cadamco

The only precision copy belt grinding machine in the world to reproduce any shape of turbine blade



- Automatic machine cycle—one operator can control a bank of machines
- Accurate to $\pm$ ·002 in.
- Currently operating throughout the British turbine industry

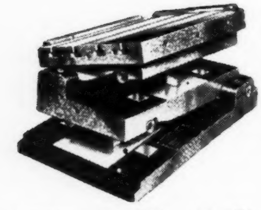
CYRIL ADAMS & CO. LTD.,

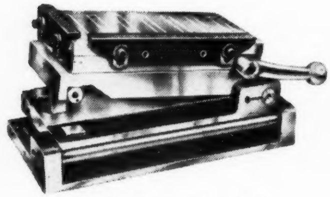
155 East Barnet Road, New Barnet, Hertfordshire
Telephone: Barnet 2335/6/7

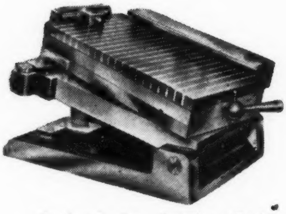
Designers and Manufacturers of Jigs, Fixtures and Special Purpose Machine Tools

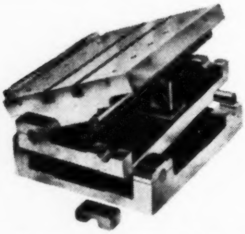
Member of the Staveley Coal & Iron Co. Limited Group of Companies, in association with James Archdale and George Richards

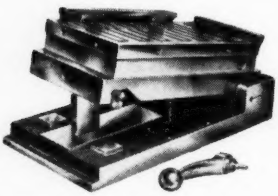
Member of the Machine Tool Trades Association

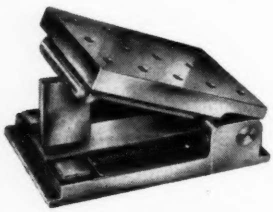

Compound Sine Table with 'T' Slotted Face: 12in. by 8in.

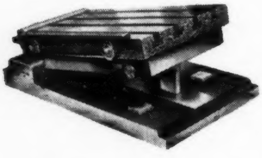

Compound Sine Table with Non-Electric Magnetic Face: 10in. by 5in.


Produced for Grinding Turbine Blades. Tilting and Swivelling with 14in. by 8in. Non-Electric Magnetic Chuck.


Special for Aircraft Industry. Completely Universal: 12in. by 10in.


Simple Angle Sine Table with Non-Electric Magnetic Face: 10in. by 5in.


Simple Angle Sine Table with Tapped Holes for Clamping: 6in. by 4in.


Simple Angle Sine Table with 'T' Slotted Face: 12in. by 8in.

A SELECTION OF COMPOSINE SINE TABLES

FROM THE COMPREHENSIVE WINDLEY

CROWN

RANGE

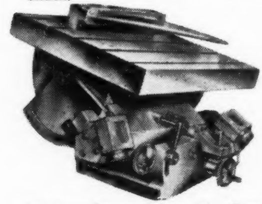
Centres for most standard types can be supplied at extra cost.

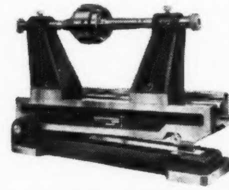
Manufactured in England by

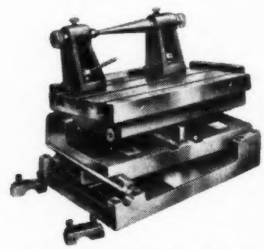
WINDLEY BROS

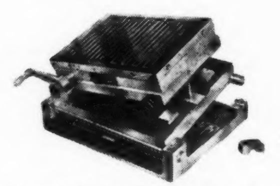
LIMITED

Write for fully illustrated brochure and prices of these and other Crown products


Special Compound with Super Accurate Scales and Optical Projection Micrometers.

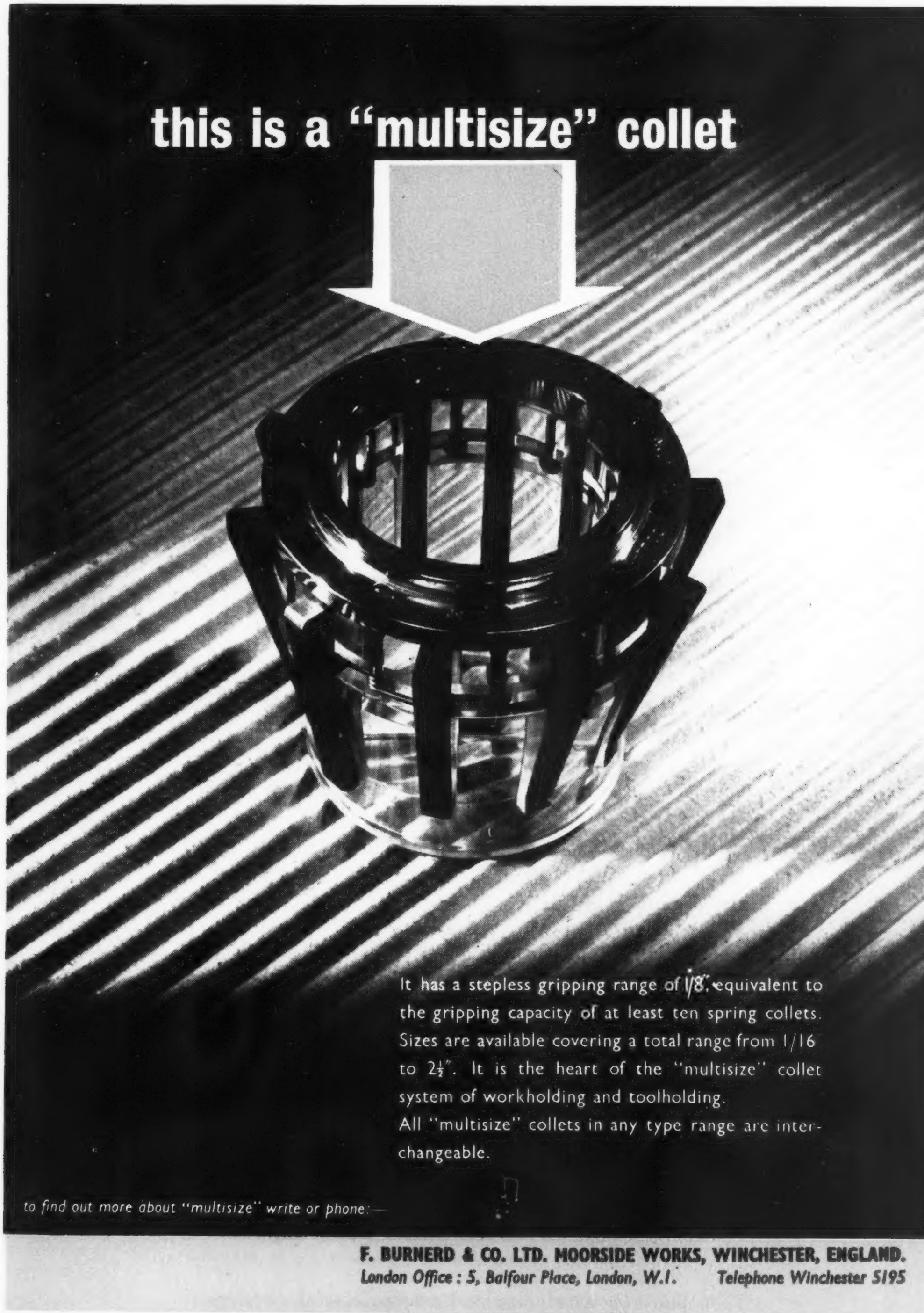

Sine Centres, with or without extended base, surfaced parallel to the centre axis when at rest.

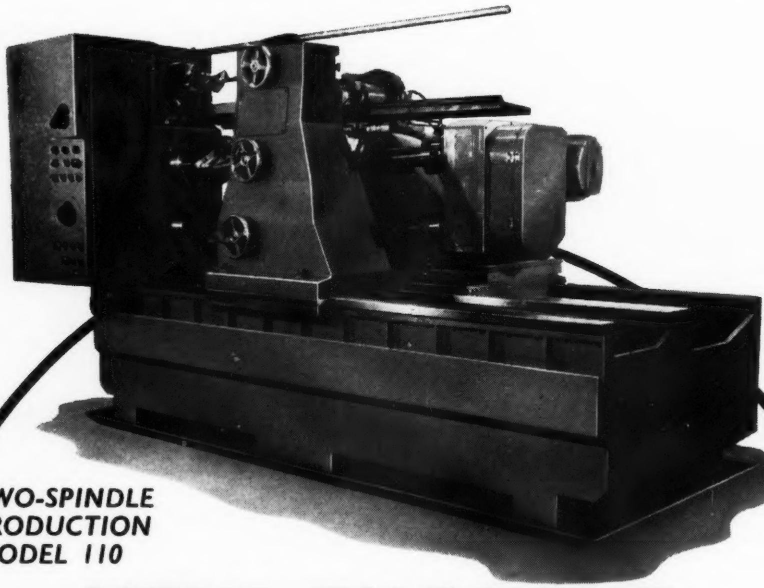

Universal Compound Sine Table with 'T' Slotted Face: 11in. by 7in.


Universal Compound Sine Table with Non-Electric Magnetic Chuck: 12in. by 8in.

CROWN WORKS · LONDON RD · CHELMSFORD · ESSEX · Chelmsford 2224

961


this is a "multisize" collet
It has a stepless gripping range of 1/8" equivalent to the gripping capacity of at least ten spring collets. Sizes are available covering a total range from 1/16 to 2½". It is the heart of the "multisize" collet system of workholding and toolholding.
All "multisize" collets in any type range are interchangeable.
to find out more about "multisize" write or phone:—
F. BURNERD & CO. LTD. MOORSIDE WORKS, WINCHESTER, ENGLAND.
London Office: 5, Balfour Place, London, W.1. Telephone Winchester 5195



TWO-SPINDLE PRODUCTION MODEL 110

NEW ENGLAND

AIRFOIL MILLING MACHINE

This newly-designed two-spindle production airfoil milling machine is an extremely large, rugged, heavy and high speed machine, capable of handling the stock removal, in one cut, from either very rough forgings—or from bar stock—to the finished shape.

The machine is particularly applicable for economical production of medium and large steam turbine blades, industrial gas turbine blades, and large compressor and turbine blades for jet engines.

Capacity permits the milling of blades up to 12in. chord width by 60in. length of foil shape.

Designed and manufactured by The New England Machine and Tool Company of Connecticut, and sold by Pratt & Whitney Company, for whom we are Sole Agents in the United Kingdom.

Also available Model 102—6in. and 107—12in. Electronic Airfoil Milling Machines.

For full details see the new Buck & Hickman Ltd., Machine Tool Catalogue, Pages 61/62.

BUCK & HICKMAN LTD.

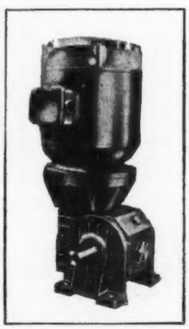
Machine Tools. **Otterspool Way, Watford By-Pass, Herts.**

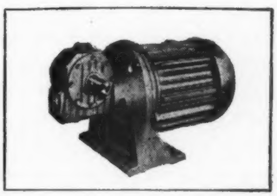
Head Office. **P.O. Box 74, Whitechapel Road, London, E.1.**

Branches. **Alperton, Birmingham, Bristol, Glasgow, Leeds, Manchester.**

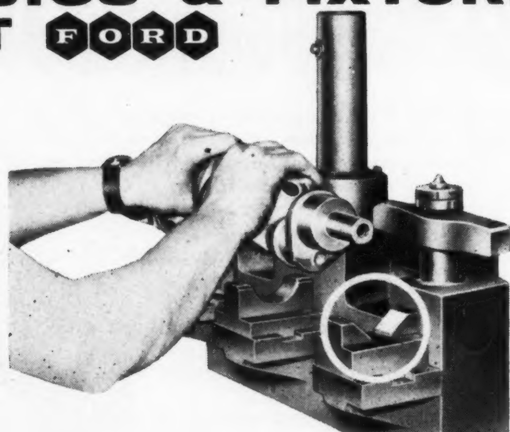

The Fastest-Changing Toolholder
SANDVIK
Coromant
T-MAX
Spring-loaded pin lifts and holds three-position chip breaker against clamp.
With the EXCLUSIVE
Spring Lifted Three Step Chipbreaker
Same Wrench Operates Screw from Top or Bottom. Saves Time on Multi-tool Set Ups.
NEW COROMANT INSERT DISPENSER
Puts a new insert at your finger-tips Calibrated slot shows remaining inserts.
SEND FOR NEW FREE BOOKLET
Covering various T-Max styles and other technical data.
Loosen, change, tighten—and you're back in production. It's as quick and easy as that with Coromant T-Max—fastest throwaway-type, carbide toolholder on the market.
Only T-Max enables you to change either or both the carbide cutting edge and depth of cut without removing or replacing chip breaker.
When set screw is loosened, a spring-loaded pin automatically lifts and holds chipbreaker against clamp—lets you change or index insert with no waste motion. When changing cut, a push with the wrench clicks the solid carbide chipbreaker into desired position for light, medium or heavy cut.
Precision-made recess seats insert accurately—ensures machining precision.
No protruding parts—two or more holders easily clamped together.
Shank of heat treated alloy steel holder - Rockwell Hardness C50, guards against damage. Special SR treated, anti-rust finish.
Precision cast, alloy steel clamp is streamlined for free chip flow.
Low cost chipbreaker cuts replacement expense.
SANDVIK SWEDISH STEELS LTD.,
MANOR LANE, HALESOWEN, BIRMINGHAM
Telephone : Halesowen 2121 (7 lines).

61

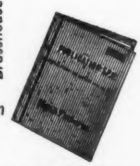




Hey machine re-centring Zephyr crankshafts.



Brasshouse machine drilling and boring Anglia crankshafts.



1961

t

W9
14

The

SICMATIC

puts small batches into the mass production range

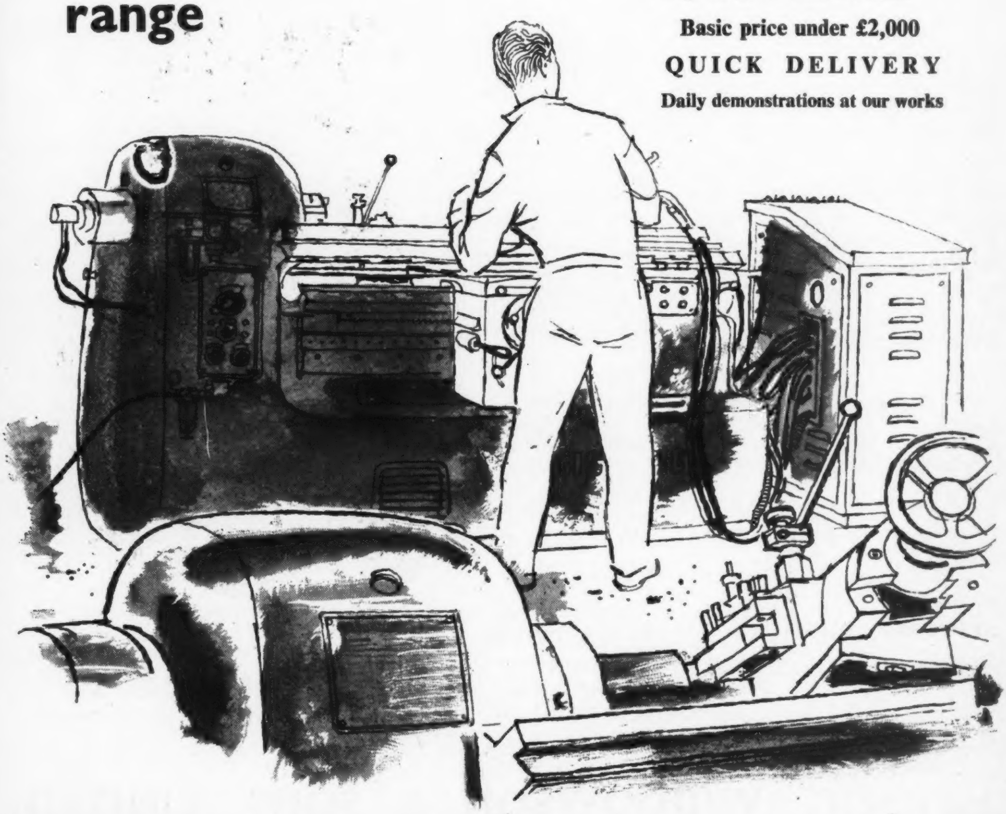
FEATURES INCLUDE:

1 Capacity 14in. by 27in.
2 Duplomatic Hydraulic System.
3 Hardened Bed Slideways.
4 Auto cycling up to six depths of cut.
5 Hydraulic tailst ck for drilling and boring.
6 Uses template or existin; component.
7 Eight models to choose from.

Basic price under £2,000

QUICK DELIVERY

Daily demonstrations at our works



HERBERT WIDDOWSON & SONS LTD

Canal Street Works, Nottingham. Tel: 51891 (4 lines). Grams: TOOLS NOTTINGHAM

twenty-one taps seven sizes

in the NEW PRESTO tap index

Hinged container with one set each of sizes $\frac{1}{8}$in., $\frac{3}{16}$in., $\frac{1}{4}$in., $\frac{5}{16}$in., $\frac{3}{8}$in., $\frac{7}{16}$in., and $\frac{1}{2}$in. Whitworth Thread Taps.
Measures 5in. × 5in. × $1\frac{1}{4}$in. when closed.
All-steel for strength, Presto for quality.

PRESTO TAP INDEX

PRESTO TOOLS are made by EASTERBROOK, ALLCARD & CO. LTD.
Head Office & Works: Penistone Rd., Sheffield, 6. Tel: 348931

London Stocks:
92-94 Borough High Street, S.E.1.
Telephone HOP 4511 (4 lines)

Birmingham Stocks:
East India House, Helena St. Parade, 1.
Telephone CENtral 6997

Manchester Stocks:
582 Stretford Road, 16.
Telephone Trafford Park 2851

PINES Bending Machines

FOR TUBING, PIPE, EXTRUSIONS AND ROLLED SECTIONS

This is the big model 4 which will handle radii up to 48 in. on pipe up to 6 in. o.d.

Pines Model 1400 Bender, makes anti-clockwise and clockwise bends. With simplified tools this is an inexpensive machine for experimental and small-lot production work.

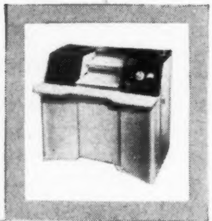
Compression and draw-bending methods are successfully adapted, in the seven standard Pines Rotary Type Benders, to best suit material and product requirements. Push-button control and semi-automatic or automatic cycling are provided on all machines except the Model 1400. Simplicity of tooling, control of springback by simple setting and uniform, dependable accuracy are major advantages which today are helping hundreds of plants to reduce costs.

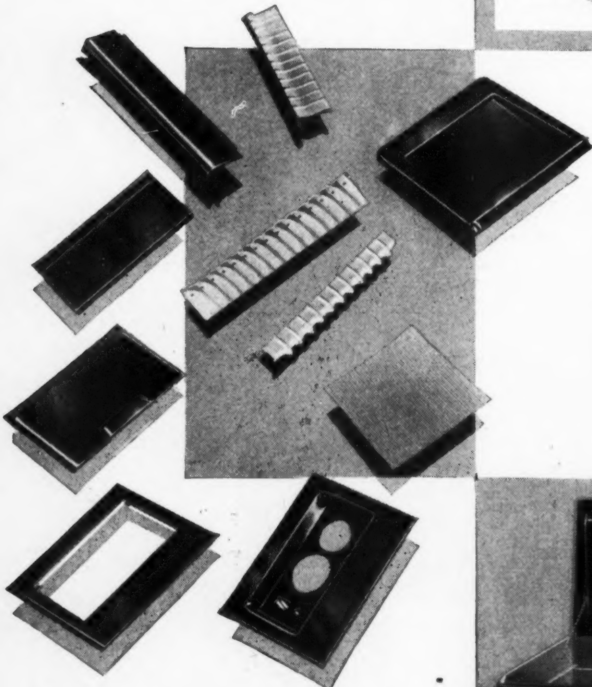
Pines machines versatility in handling all types of materials and shapes suitable to cold bending, is apparent from the following applications—Automobile Chassis Frames, Refrigeration and Air Conditioning Coils, Thin Wall Steel Aircraft Parts, Extrusions.

WICKMAN LIMITED

Factored Machine Tool Division, Fletchamstead Highway, Coventry. Tel: 74321

565 F54

Remington Rand  use Cobex...



for the parts of their Auto Dy-printer fabricated by Spears & Cossom, Ltd.

for its fine finish, ease of production and complete corrosion-resistance

Many parts of the "furniture" of the Remington photocopying machine have to sustain progressive chemical attack. So they are made in Cobex. But Cobex has another important virtue: it is easily formed by ordinary draw or drape moulding—at a fraction of the cost of the expensive dies required to make the same article in metal or other materials.

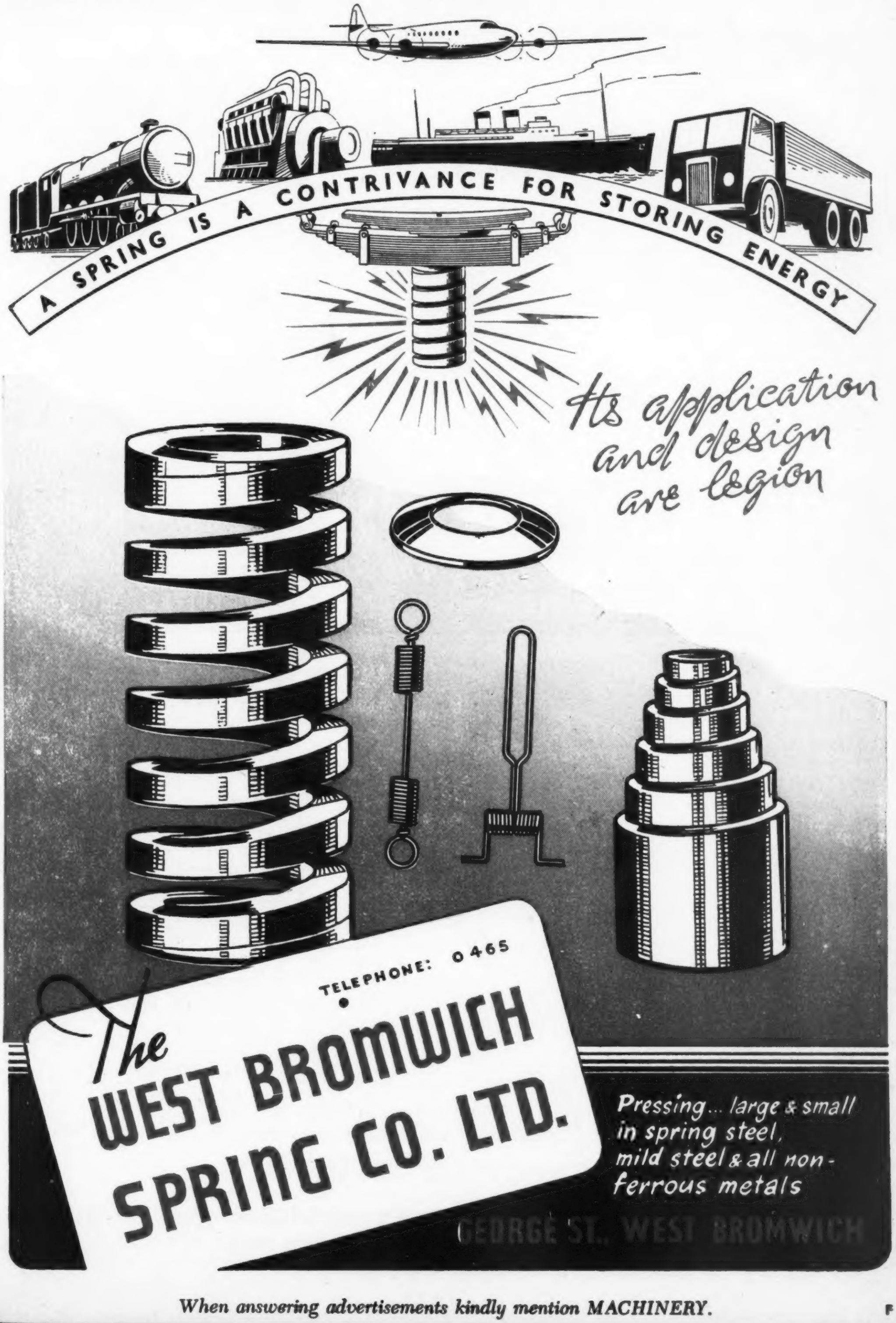
The attractive appearance of the polished Cobex is an important feature of the material. The colours are inherent so that unsightly chipping and worn patches are eliminated. No painting or finishing is necessary, giving obvious economies in production and maintenance.

COBEX Regd.

RIGID VINYL SHEET

BX PLASTICS LTD

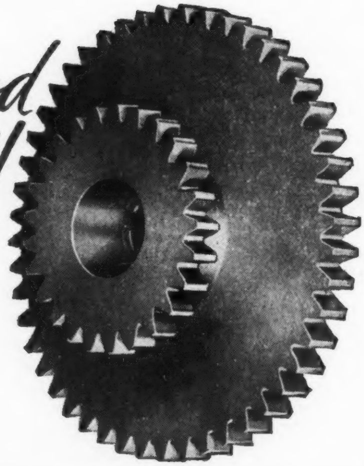
The British Xylonite Group. LONDON E.4 LARKSWOOD 5511


A SPRING IS A CONTRIVANCE FOR STORING ENERGY
Its application and design are legion
TELEPHONE: 0465
The WEST BROMWICH SPRING CO. LTD.
Pressing... large & small in spring steel, mild steel & all non-ferrous metals
GEORGE ST., WEST BROMWICH

GOOD TEETH...

Looks good are good!

CLUSTER GEARS
Diameter 36in.
Max. D. P. 5.



WEEKS AND WILSON LTD.

GEARS AND GEAR CUTTING

581, GREEN LANES, HARRINGAY, LONDON. N. 8. TEL: FITZROY 0055-6

NEW The Duplex

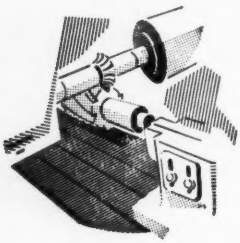
SELF-FEEDING SHEAR

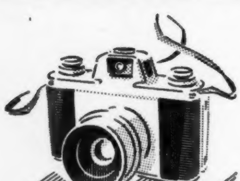
AIR OR ELECTRIC

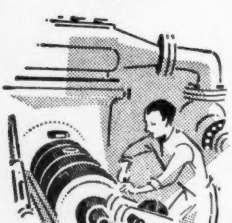
This new addition to the range of Duplex Portable Shears is specifically designed to eliminate the hard work and operator fatigue in cutting across wide mild steel sheets from 12 to 7 S.W.G.—and thicker gauges of light alloy sheet. Send for details of this outstanding development.

DUPLEX ELECTRIC TOOLS LTD · HIGH ST · PURLEY · SURREY

TELEPHONES: UPLANDS 3731 & 8621

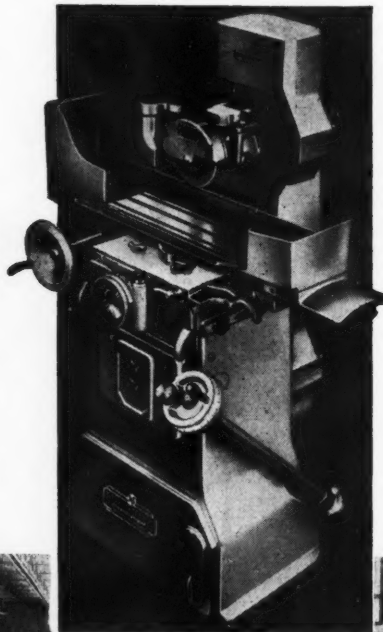






When answering advertisements kindly mention MACHINERY.

MULLARD ONE OF THE THOUSANDS OF SATISFIED USERS OF



JONES – SHIPMAN

'540' SURFACE GRINDERS

Jones-Shipman '540' Surface Grinders are used extensively at the various factories in the Mullard group of companies. This world famous electronics organisation relies on these machines for manufacturing the tools and fixtures necessary for producing many of their wide range of products. The merits of the '540' are universally known. They are installed in all the best toolrooms giving first class service and performance. When you need a toolroom surface grinder specify Jones-Shipman model '540' 6″ × 18″ capacity.

J & S

A. A. JONES & SHIPMAN LTD., LEICESTER. Tel: Leicester 823222.

London Office & Showrooms: 50/52 Great Peter Street, London, S.W.1. Tel: ABBey 5908/9.

CUT YOUR COSTS IN HALF
with the tool rotating

'ENDOMATIC'

* UP TO SIX TOOLING STATIONS
* A COMPLETE RANGE OF MODELS TO MEET ALL PRODUCTION NEEDS

ENQUIRE NOW AS TO JUST WHERE AND HOW THE 'ENDOMATIC' CAN CUT YOUR PRODUCTION COSTS

* COMPLETE ENGINEERING SERVICE AVAILABLE ON YOUR OWN PROBLEMS

MADE BY GIDDINGS & LEWIS-FRASER LTD., ARBROATH, SCOTLAND. TEL: ARBROATH 2033
SOLE AGENTS FOR U.K.: SIDNEY G. JONES LTD., 8 BALHAM HILL, S.W.12. TEL: BATTERSEA 3246

FRASER


A STYLE APPLICABLE TO EVERY INDUSTRY
Two only replaceable assemblies in the electrical side: moulded one-piece contact block and arm. Interchangeable on all Mark II versions.
Water Oil and Dustproof or Flameproof versions
4¾"
STANDARD
WATER, OIL & DUSTPROOF
Single pole, double break, double throw, operates with either circuit normally open with other closed, or maintaining in either position, or available with central (neutral) position and/or centre connection. Heavy aluminium die-cast case. Conduit ¾" B.S., or No. 3 Admiralty Pattern Cable gland entry. Two-screw side mounting or backplate mounting in two styles, or Tandem style (back to back mounting). Operating lever position adjustable in 7.5 deg. increments through 82.5 deg. either way from normal.
Standard Neutral position or Centre connection
10"
FLP
FLAMEPROOF
The mechanism of the Flameproof switch is easily removable as a unit for servicing.
MARK II
SINGLE OR DOUBLE ENTRY
Buxton certificates No. 3574 (Group I) No. 3575 (Groups II and III gases). Meehanite iron castings. Self wiping solid silver contacts, interchangeable plugs and sockets. Single SWA cable entry (standard); double entry if required. Operating lever position adjustable in 7.5 deg. increments through 360 degs. Single pole, double break, having one normally closed and one normally open circuit. Available with central (neutral) position and/or centre connection.
B.S.A.
SNAP-LOCK
ACME
Catalogue of switches and levers on request
HEAVY DUTY LIMIT SWITCHES
A few examples from the range of more than 40 styles (over 150 sizes) of interchangeable operating levers. List on request.
Made in England under Licence by
B.S.A. SMALL TOOLS LTD., BIRMINGHAM, 11
TRADE MARKS
B.S.A. TOOLS DIVISION
Sole Agents U.K.
BURTON GRIFFITHS & Co Ltd
SNAP-LOCK DEPT MONTGOMERY STREET
BIRMINGHAM 11. Tel: VICTORIA 2351

Spectra aids

TO INDUSTRY

Spectra products are used throughout Industry—in this country and abroad. Fully illustrated and descriptive literature will be gladly sent on request.

SPECTRA

AIDS TO INDUSTRY

OTHER PRODUCTS

SPECTRA-COLOR Layout and Identification Fluid; Standard Grade for all bright metals, Opaque Grade for black metals and unmachined castings. Both grades in 13 colours, in pints, quarts, ½ gals. and gals. SPECTRA-SPRAY Tool Room Blue—Spectra-Color Blue in the speedy aerosol pack.

SPECTRA CHEMICALS LIMITED

Spectra Works, High Street, Caterham, Surrey.
Telephone: Caterham 3182 & 2293.

RID-O-RUST

For rapid rust removal and positive protection.

Removes all surface rust in 1 *cold* application, and neutralises deep seated corrosion in the pores of the metal. Needs no rinsing, the surface is ready for painting. ½, 1, 5 and 10 gal. sizes and upwards, also in Poly-Packs of 6 fl. oz. and 1 pint.

RID-O-GREASE

All purpose metal degreasing compound.

Quick, easy, positive, it emulsifies all grease and dirt particles, which are rinsed away. Entirely non-corrosive and very economical in use. Packed in crystal form ready for making up. In 3 sizes to make 5, 20 or 50 gals.

SPOT-LEAK

The new method of detecting leaks in equipment employing air or gases under pressure.

One liberal application of Spot-Leak and a leak becomes immediately visible, giving off either a frothing action or a cumulative succession of larger bubbles. Will not damage metal, rubber, wood or plastics; non-poisonous, non-volatile. ½ pt. and 1 pt. Poly-Packs, 1 gal. tins.

SOLDAFLO

High efficiency general purpose fluid soldering flux.

Makes the solder run right into the joint quickly and evenly ensuring a tighter and more secure joint than ever before. Anti-corrosive properties neutralise small patches of rust—coloured for visual coverage check. Poly-Packs of 6 fl. oz.

$5\frac{1}{4}$ Million Operations . . .

no spares,

no maintenance

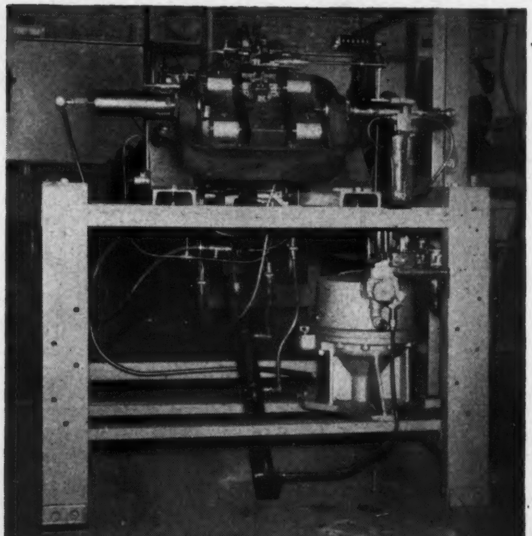
Here is undeniable proof that "BROOMWADE" pneumatic equipment is unsurpassed for *Efficiency* and *Reliability*.

In 1955, Messrs. S. Smith & Sons (England) Ltd. installed two "BROOMWADE" Type HPS6 Squeeze Riveters with HPS5 Intensifiers. They are employed for side piercing four holes in speedometer brackets.

Each machine has performed $5\frac{1}{4}$ MILLION OPERATIONS *WITHOUT* any SPARES or MAINTENANCE. A third machine is now being installed.

You will be well advised if you discuss your compressed air problems with a "BROOMWADE" works-trained technical representative. Meanwhile, may we send you a copy of our leaflet giving full details of "BROOMWADE" Squeeze Riveting Equipment?

Two views of the "BROOMWADE" Hydro-pneumatic equipment installed by Messrs. S. Smith & Sons (England) Ltd., by whose permission these pictures are published.



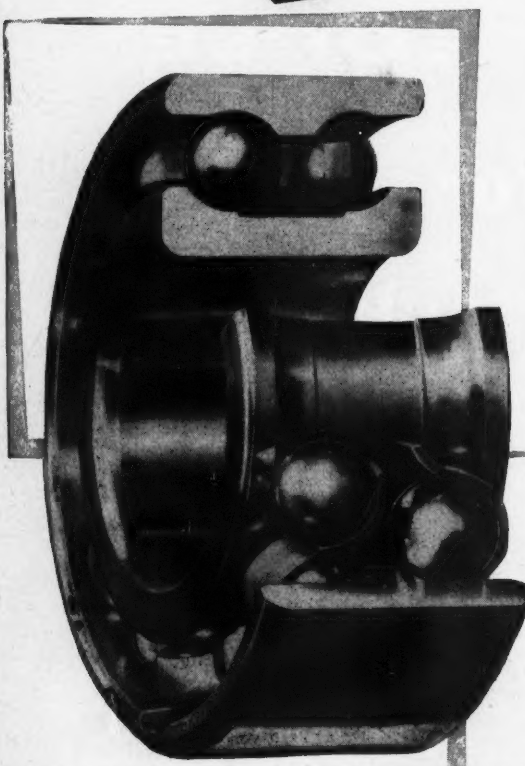
"BROOMWADE"

Air Compressors and Pneumatic Tools
Your Best Investment

Broom & Wade Ltd., P.O. Box No. 7, High Wycombe, Bucks. Telephone: High Wycombe 1630 (10 lines) Telex: 83-127

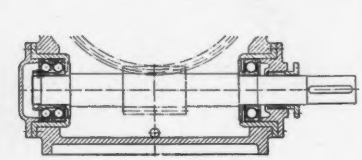
793 SAS

Only SKF *can offer such a wide selection of British made bearings*



In the various applications of rolling bearings, the double row angular contact ball bearing is useful where the displacement of a shaft subject to axial loads must be kept within very narrow limits. The ball tracks in bearings of this type are disposed so that the load paths through the balls intersect the shaft centre line outside the bearing.

Amongst the ten variants of the four basic types of rolling bearing manufactured in Great Britain by SKF you can find exactly the right bearing for your specific needs. In cases of doubt the Skefko technical service, unique in its world experience of design and application, is available from any one of twenty Branch Offices in the British Isles.



Worm shaft of worm gear unit

THE SKEFKO BALL BEARING COMPANY LIMITED · LUTON · BEDS

THE ONLY BRITISH MANUFACTURER OF ALL FOUR BASIC BEARING TYPES: BALL, CYLINDRICAL ROLLER, TAPER ROLLER AND SPHERICAL ROLLER

G180

MACHINERY is registered as a newspaper at the General Post Office and is published every Wednesday by The Machinery Publishing Co., Ltd. The name is a registered trade mark.

LONDON OFFICE

REGISTERED OFFICE, EDITORIAL, SMALL AND CLASSIFIED ADVERTISEMENTS DEPARTMENTS AND ENQUIRY BUREAU

CLIFTON HOUSE
83-117 EUSTON ROAD
LONDON, N.W.1.

Telephone: Euston 8441/2
Telegrams: Machtool, Norwest, London

HEAD OFFICE

SUBSCRIPTION, ADVERTISEMENT, SERVICE, PHOTOGRAPHIC, ACCOUNTS AND BOOK DEPARTMENTS

NATIONAL HOUSE
21 WEST STREET
BRIGHTON, 1.

Telephone Brighton 27356 (4 lines)

Telegrams: Machtool, Brighton

NEW YORK: 93, Worth Street

PARIS: 15, Rue Bleue

PRICE PER COPY:—One shilling and threepence.

SUBSCRIPTIONS:—Inland and overseas, 52 shillings per annum (and pro rata), post free. Cheques and Money Orders should be made payable to the Machinery Publishing Co., Ltd.

ADVERTISEMENTS:—Copy for displayed advertisements, if proofs are required, should reach the Brighton office 21 days in advance of publication. Rates on request.

Small (classified) advertisements can be accepted, space permitting, at the London office up to Wednesday, for publication on the following Wednesday. For rates, see p. 134.

Blocks are held at advertisers' own risk; no responsibility for loss is accepted by the publishers.

MACHINERY

A JOURNAL OF METAL-WORKING PRACTICE & MACHINE TOOLS

Vol. 98, No. 2516 — February 1, 1961

COPIES PRINTED	11,500 per week
CERTIFIED DISTRIBUTION	11,389 per week
CERTIFIED PAID DISTRIBUTION*	9,863 per week
**Analysed by publishers as follows*	
Copies sold at full price	9,599 per week
Copies sold at reduced prices	264 per week

CONTENTS

S

Abstracts of Principal Articles

The Production of the SIMCA Aronde P. 236

The assembly shop at the SIMCA plant, at Poissy, France, consists of the original main factory building and a new extension which has increased the area by more than 50 per cent. Components from the press shop on one side and the machine shop on the other are fed into the assembly shop, which has sub-assembly sections arranged transversely at one side, whence work is passed to assembly and finishing lines that extend lengthwise. One sub-assembly section provides for the production of doors, and the equipment installed includes two interesting Languepin multi-point spot-welding presses with special arrangements for the transfer of welding tools used for different types of doors. The roof sub-assembly section incorporates a number of floor mounted spot-welding jigs, one of which embodies hydraulic punch units for piercing a number of holes. A large hydraulically-operated fixture provides for piercing other holes, also for trimming the main and secondary pressings of the assembly. Welding of the roof sub-assemblies is completed on a roundabout with four trolley jigs. (MACHINERY, 98—1/2/61.)

New Red Ring Inspection Equipment for Gears .. .. P. 248

Recent additions to the Red Ring range of inspection equipment for gears, which is made by the National Broach & Machine Co., Detroit, Mich., U.S.A., includes the rolling gear testers types GRH and GRJ. The latter unit is intended specially for checking gears with integral shafts, and can be fitted with new recording equipment of the paper strip type. Other machines described in this article include the type PCB involute tester for gear shaving cutters and the type GSC gear speeder which is equipped with a microphone, an amplifier and a dial-type meter. (MACHINERY, 98—1/2/61.)

Quantity Production of Laminations for Transformer Cores .. .. .. P. 250

A special fully-automatic installation for producing laminations for transformer cores in a wide variety of sizes and designs has recently been put into operation at the Transformer Department of Ferranti, Ltd., Hollinwood, Lancs. The new equipment is akin to a transfer press and has an overall length of 60 ft. Special cold-rolled grain-orientated steel, in coil form, is fed to the installation, which incorporates two main press sections. Two completely pierced and blanked laminations are produced at each stroke of the presses, and are delivered to special stacking units at opposite sides of the machine. Since at both press stations the strip is located from its theoretical centre line, any manufacturing errors are halved and it is stated that a considerable increase in the accuracy of the laminations has been obtained as a result. (MACHINERY, 98—1/2/61.)

Transistor Production in Japan .. P. 253

The Tokyo Shibaura Electric Co., Ltd., which is one of the largest firms engaged in electrical manufacturing in Japan, recently built a special factory designed specifically for the mass production of a range of transistors by the most modern methods. The building is mainly of windowless construction, and all the production areas are supplied with filtered air at a constant temperature and controlled humidity. Some 2,800 people are employed, on a two-shift basis, and some 5,000,000 transistors are produced per month. Brief reference is made to some of the special machines developed for operations on transistor components. (MACHINERY, 98—1/2/61.)

Cross Transfer Machine for Small Cylinder Blocks .. .. P. 272

This article describes a complex in-line transfer machine which has been supplied by the Cross Company, Detroit, Michigan, U.S.A., for operations on small cylinder blocks. The machine provides for milling a number of faces, also for drilling and boring a total of 123 holes of different sizes. Operations include cylinder boring, cam- and crank-shaft boring, assembly of main bearing caps, water pressure testing to detect porosity, and final inspection with the aid of air gauging equipment. (MACHINERY, 98—1/2/61.)

Fillet-rolling Operations on Diesel-engine Crankshafts .. .. P. 276

At the Ford Tractor and Implements Division Works, Mich., U.S.A, a Schraner machine is employed for rolling the fillet radii of the main and pin journals of diesel-engine crankshafts. Wedge-shaped free-running rollers are applied under pressure to the fillets, and provide for " kneading " the metal. The rolling operation is stated to increase the hardness value of the fillet from 34 to 55 Rockwell C, and to provide a surface finish of 30 to 12 micro-in. (MACHINERY, 98—1/2/61.)

EDITORIAL

Health in Industry

Apart from the humanitarian aspects, the physical and psychological well-being of those employed in industry continues to assume increasing importance in connection with productive efficiency. With advances in mechanization and automation, there is inevitably a trend towards greater inter-dependence between the activities of groups of workers, and unexpected absences on account of injury or sickness may cause much greater dislocation than would result if the tasks of those concerned were not directly related to the activities of their neighbours in the factory. Similarly, if one worker in a team, or on a production or assembly line, although present, is unable to maintain the customary pace and quality by reason of temporary physical unfitness or mental disturbance, the effects may be far-reaching. Obviously, if manufacturing or assembly operations are highly integrated, there must be an efficient organization within a works to ensure that at any time the labour force immediately available can be rapidly and smoothly deployed in such a way as to minimize dislocation caused by absentees. In general, however, if the best results are to be obtained from any given installation of production equipment, it is desirable that all reasonable steps should be taken to reduce, as far as possible, loss of time occasioned by ill-health or accident.

As has often been shown, it may prove economical, as well as otherwise desirable, to provide a working environment of a higher standard than is strictly necessary to satisfy the statutory requirements. It may be found, for example, that the cost of ensuring greater cleanliness, or of providing better lighting, heating or ventilation, may be more than recovered as a result of improvements in work output or quality. In the same way, the introduction of safeguards more elaborate than those demanded by law, apart from affording added protection against injury, may result in a higher speed of working occasioned by greater confidence.

Apart from what can be accomplished in these directions, however, important contributions are made by the factory medical services, and the work that is being done was very competently discussed by Prof. Ronald E. Lane, C.B.E., M.D., M.Sc., in the Sir Alfred Herbert Paper presented last year to the Institution of Production Engineers. Industrial medicine, he explained, covers a very wide field, "it is concerned with the accident to the apprentice and with the production manager's nervous breakdown, with the effects of a new chemical and the design of a typist's chair." The preventive aspect of this work is of particular significance, and is becoming increasingly complicated. At the same time "the treatment side in industry is considerable and is larger than is sometimes realized."

To supplement the activities of the Medical Inspectors of Factories and the Appointed Factory Doctors, voluntary services have been introduced and have grown comparatively rapidly during the past 30 years. The object of these services, which have not been confined to dangerous trades, is to provide the employer with better means for carrying out his statutory duties, and with more effective medical facilities that go beyond statutory requirements. Accepted functions of such a service fall into two main groups, namely, those directed to the individual worker, to ensure that he is fit for his job, and those directed to the environment to ensure that it is fit for the worker. For obvious reasons, the more complete voluntary services tend to be confined to the larger industrial organizations, and it is estimated that not more than half of the total number of factory workers have the benefit of such services. The possibility of extending these services to many smaller factories might well be examined, but it is probable that in numerous instances they would be difficult to provide and, indeed, difficult to justify. Prof. Lane concludes, however, that every encouragement should be given to the expansion of voluntary services.

To remain effective, provisions for the health of factory workers must obviously be kept up to date, and to this end changes in industry must be kept under close scrutiny. Among the problems associated with the "prescription of a healthy physical environment" which are now awaiting solution may be mentioned the long-term effects of certain chemicals, the best use of the middle-aged and older worker, the changes resulting from automation, and the physiological effects of shift work.

In conclusion, attention may be drawn to Prof. Lane's statement that "industry has far greater powers to influence health than any doctor" since health depends so largely on a reasonable standard of living and on equanimity. The standard of living, in turn, is dependent on the prosperity of industry. Moreover, "industry's influence on peace of mind can be enormous."

The Production of the SIMCA Aronde

Methods and Equipment Employed for the Production of Body Components for this Popular French Car in the New Works at Poissy

By P. A. SIDDERS, Chief Associate Editor

EARLIER ARTICLES IN THIS SERIES* have been concerned with the machining of various components for the Aronde car, which is now being produced in large quantities by the French firm of SIMCA, also with heat treatment facilities, and equipment in the press shop at the Poissy plant. This article, and others to be published in forthcoming issues of MACHINERY, will be devoted to the production of body sub-assemblies, body building and welding, painting, trimming and finishing.

Fig. 1 is a diagrammatic layout of the Poissy factory, with the flow of work indicated. The main assembly shop *A* is located between the machine shop *B* and the press shop *C*, and comprises the main building of the old Ford plant, which covers an area of 63,500 sq. yd., and a new extension of 38,200 sq. yd. This extension is partly of two and partly of three storeys, and the upper floors house the paint shop and associated departments. Raw material flows into the plant by the route indicated at *D*, and components pass

* MACHINERY, 95/252–19/8/59; 95/676–7/10/59; 96/784–6/4/60; 96/860–20/4/60; 96/1036–11/5/60; 97/80–13/7/60; 97/1104–16/11/60; 97/1220–30/11/60; 97/1392–21/12/60; and 98/18–4/1/61.

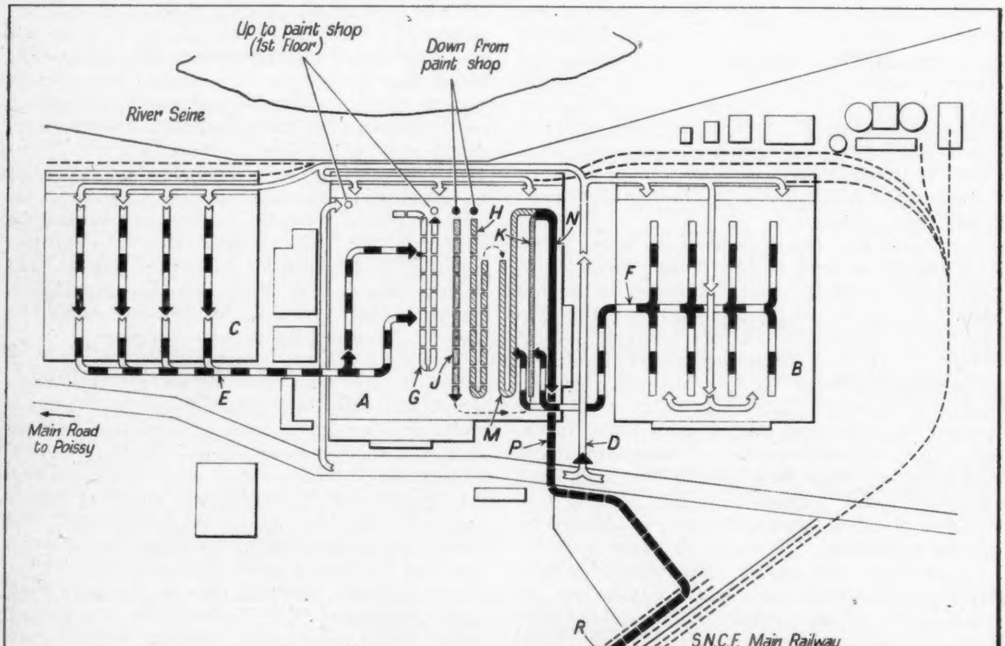


Fig. 1. Diagrammatic layout of the SIMCA plant at Poissy, France, showing the flow of work into and through the main assembly shop *A*. The machine shop is seen at *B* and the press shop at *C*.

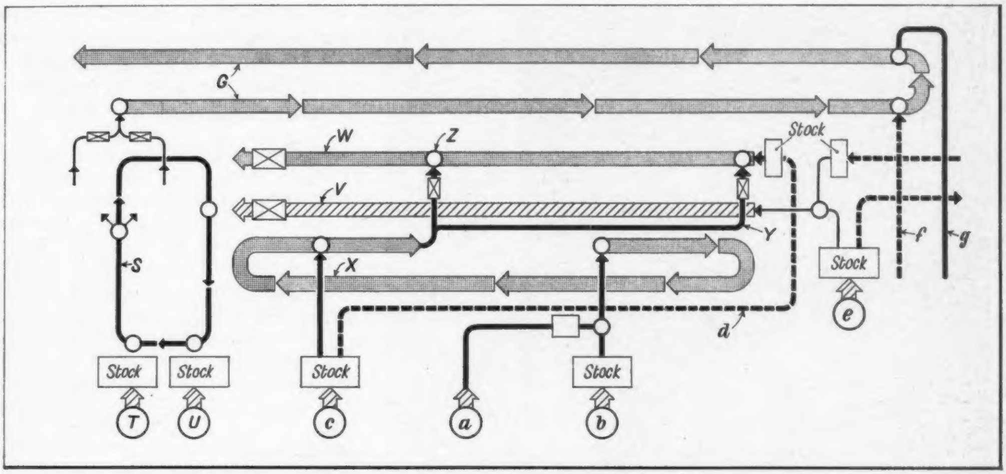


Fig. 2. Schematic layout of the main body building line *G*, the under-body finishing line *W*, the roof finishing line *V*, and auxiliary sections in the assembly shop of the SIMCA plant

from the press shop to the sub-assembly and spot-welding sections of the assembly shop by way of the route indicated at *E*. Those parts that flow direct from the main machine shop to the assembly shop follow the route *F*.

In the sub-assembly sections of the main assembly shop, the work flows across the shop towards the main body assembly line *G*, which is of elongated-U form, and on reaching the end of this line, the body shells are transferred by conveyor to the paint shop on the floor above. The layout of this department, and the operations performed therein, will form the subject of a later article.

From the paint shop, the body shells are returned to the ground floor and pass to the starting end of the trimming line *H*, which is also of elongated-U form, but with legs of uneven length. The line *J*, it may be mentioned, provides for trimming operations on the larger Vedette car, which is built in smaller numbers, and from the end of this line, Vedette bodies pass to the final assembly line *K*. Bodies for Aronde cars are transferred from the end of the trimming line to a final assembly line *M*, also of elongated-U form, and completed cars from the end of this line, also cars from the Vedette line, pass to the finishing and touching-up line *N*. The end of this line connects with a subway *P*, through which the cars are driven to an outside parking area, adjoining the loading bay *R* for rail transport.

The layout of the sub-assembly sections and the body-building line is shown in more detail in Fig. 2. In this illustration, the main body assembly line is again indicated at *G*, and its starting end is adjacent to a closed-loop trolley line *S*, known as a " berceau ", which provides for the assembly and spot welding of the roof to the under-body, and the attachment of various other sub-assemblies. These latter units include the front wings and cross-member sub-assembly, which is fed to the berceau as indicated by the arrow *T*, also the front body sub-assembly, comprising the front bulkhead and the inner wings, which is delivered as shown by the arrow *U*. Roof sub-assemblies are delivered to the berceau from the end of the finishing conveyor *V*, and under-bodies from the end of the finishing conveyor *W*.

Under-bodies are built up on a closed-loop spot-welding line *X*, and it may be noted that different designs are employed for the 2-door and 4-door cars. Under-bodies for 2-door cars are transferred by the conveyor *Y* to the starting end of the finishing line, and those for 4-door cars are delivered to an intermediate point *Z*. Front and rear floor panel sub-assemblies are fed by conveyor to the spot-welding line *X* from a section at one side as indicated at *a*, and side members are delivered to the same point from a section indicated at *b*. Sub-assemblies comprising the rear wings and luggage boot rear bulkheads are prepared in adjoining sections, and are fed towards the spot-welding line as indicated by the arrow *c*. Sub-assemblies for 2-door cars are transferred by truck to the start-

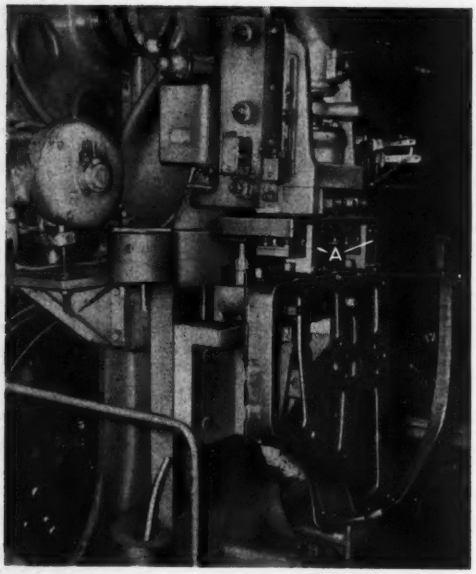


Fig. 3. The set-up for piercing the hinge fixing holes in Aronde doors on a Spiertz plain-fronted power press

ing end of the finishing line, as shown by the dotted line *d*, whereas those for four door cars are delivered by conveyor to an intermediate point on the line *X*.

Roof sub-assemblies are delivered from a section at one end of the department as indicated by the arrow *e*, and are transferred by conveyor to the head of the roof finishing line. Bonnets and boot lids are delivered by truck as shown by the dotted line *f* to the body assembly line, and doors are transferred by the conveyor *g*.

DOOR PRODUCTION

Front and rear doors are built up in a narrow section at right-angles to the roof and under-body finishing lines. Pressings are delivered to the end of the section remote from the finishing lines by fork-lift truck and are stored on stillages. Early stages in the production sequence provide for deburring and scurfing the outer panels at benches, with the aid of portable electric tools, followed by the application of bituminous sound-deadening material. This material is laid in the required positions on the panels which are then fed through a conveyorized infra-red oven. The material softens and adheres to the panels during their passage through the oven.

After deburring and preliminary spot-welding operations to secure certain reinforcing members, door inner panels are passed to a Spiertz plain-fronted press on which the hinge fixing holes are pierced. This press is shown in Fig. 3 with an inner panel for a rear off-side door in position. Since panels may be of four types (front or rear, near-side or off-side), a corresponding number of press tools is required. Spare tools are stored on a roller conveyor fitted to a supporting framework at one side of the press, and are transferred to the narrow table, bolted to the front of the press frame, by means a short length of roller conveyor mounted on a trolley. Each press tool is provided with ball-bearing guide pillars and bushes, and incorporates

Fig. 4. One of the two Languepin multi-point spot-welding machines for the assembly of door inner and outer panels. Each machine is used for doors of two different types, and the tool for one type is stored on an extension at one side while the other tool is in use

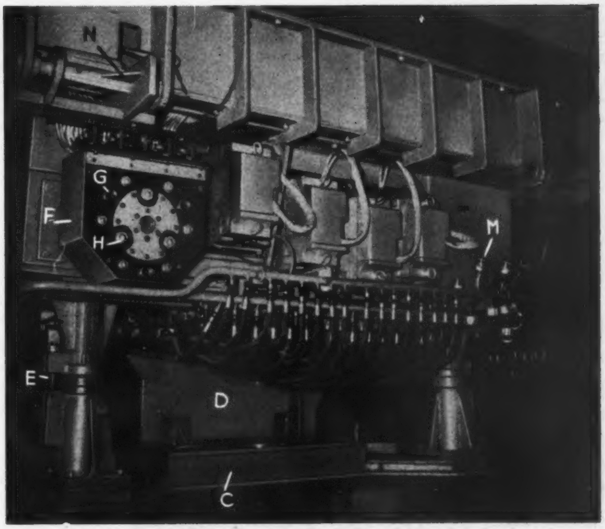


Fig. 5. Close-up view of one of the tool assemblies for doors used on the Languepin machine. Before the tool is moved to the storage position, the lower element is secured to the top member

a spring-loaded stripper plate, the springs taking the form of stacks of Belleville washers. The door inner panel is thrust inwards, into contact with a stop bar on the lower tool, by spring-loaded steel blocks carried on two brackets, as at *A*, secured to the upper tool assembly.

Door inner panels unloaded from the Spiertz press, are passed alternately to benches at each side. Adjacent to each bench there is a riveting machine, the operator of which assembles the hinges and secures them in position. From these machines, the inner panels are loaded on to a chain conveyor, which also receives the outer panels from the outlet end of the infra-red oven. On this conveyor, the panels are carried to two multi-point spot-welding machines supplied by La Soudure Electrique Languepin. One spot welding machine provides for the assembly and welding of front off-side and rear near-side doors, and the other for front near-side and rear off-side doors. It will be understood that different tools are required for the various types of doors, and the tools for the front doors provide for making 62 spot-welds, and those for rear doors, 58 spot-welds. The machines are used alternately, and while one machine is in operation, the tooling on the other is changed and service work is carried out.

TOOL TRANSFER ON SPOT-WELDING MACHINE

A general view of one of the Languepin spot-welding machines is given in Fig. 4, and each is completely self-contained, with built-in supply systems for hydraulic and pneumatic power. The machine proper is approximately square in plan, and occupies the area immediately in front of the operator in the figure. On either side of the main structure, there are extension wings, the ends of which are supported on circular columns. Below these wings are mounted rails which pass through the main structure of the machine, and the two spot-welding tools used with each machine are arranged to travel along these rails. The arrangement is such that while one tool is in use, the other can be stored clear of the work-zone, suspended from the rails below one extension wing. When a tool change-over is necessary, the tool that has been used in the machine is moved sideways to a position below the other extension wing, as indicated at *B*, after the electrical and other supply lines have been disconnected, and the other tool is traversed into the working position. The tools are moved from the machine to the storage positions by means of a pneumatic cylinder and cable.

Fig. 5 is a close-up view of the tool at *B*, Fig. 4, and it will be observed that it is a self-contained unit. The lower tool assembly *C* moves on four guide pillars that project downwards from the upper assembly, and incorporates a formed support block *D* for the door outer panel. On each guide-bush bracket of the lower tool there is a swinging bolt, as at *E*, and before the tool is traversed to the storage position, each bolt is swung upwards between the cheeks of a yoke piece on the guide pillar bracket at one corner of the upper tool. A nut is then tightened on each bolt to secure the lower tool to the upper assembly, so that the tool moves as a unit.

At one end of the upper tool there is a large electrical connection box *F*, which provides for the supply of power to the various banks of electrodes. This box incorporates three plain bushes, as at *G*, a central bush which has an internal square-section thread, and a series of sockets, as at *H*. When the tool has been moved to the

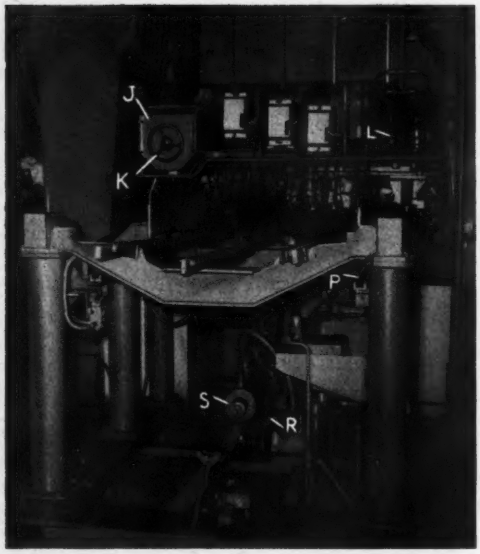


Fig. 6. The loading arrangements on the Languepin multi-point spot-welding machine for doors. An air operated loader carries the work from the rollers in the foreground to a position over the support block of the lower tool

working position, a corresponding box connected to the machine is assembled to the box *F*, and a series of plug pins engage the sockets. This box may be seen at *J* in Fig. 6, and it has three cone-end pins to engage the bushes *G*, Fig. 5, and thus ensure that the electrical connections are made correctly. A large insulated handwheel *K*, Fig. 6, is keyed to a central screw, which mates with the central threaded bush to secure the box *J* in position, and a handle is provided at each side of the box to facilitate manipulation.

Hydraulic connections are made by couplings, as at *L*, attached to the ends of short lengths of flexible pressure-tubing. There are four lengths of tubing, fitted to the ends of pipes at the front of the machine, which are connected to the hydraulic supply unit on the superstructure. The sockets for these couplings may be seen at *M* in Fig. 5. Cooling water connections are made by means of quick-release couplings to pipes mounted on the right-hand front upright of the machine. With the arrangements described, the time required for tool changing is 45 min.

It may be mentioned here that the upper tool is not carried on the supporting rails by the whole length of its front and rear sides, but only by a portion at each end. When the tool is in the storage position, these bearing portions rest on sections of rail fitted to hinged brackets as at *N*, Fig. 5. Normally, these brackets are secured in the position shown by screws, and the short sections of rail mounted thereon are aligned with the main rails. Above each extension wing there is a gantry from which an electric hoist is suspended, as may be seen in Fig. 4. When it is necessary to remove a spot-welding tool completely from the machine, the hook of the hoist is coupled to the tool, and the slack in the hoist chain is taken up to support the weight. The brackets carrying the short sections of rail are then released and swung downwards and outwards, and each is secured in a position clear of the tool by a pin which passes through a hole in an integral extension arm. By means of the hoist, the tool can then be lowered clear of the extension wing structure.

As may be seen from Fig. 5, all the spot-welding electrode assemblies are disposed horizontally, and each incorporates a hydraulic cylinder to urge the moving electrode towards and away from the work. Assembled door inner and outer panels are loaded on to the banks of rollers, seen in the foreground in Fig. 6, which are supported on pillars at the front of the machine. Between the banks of rollers move dogs and supports attached to a loading shuttle, which is carried on rails at either side, as at *P*. The shuttle is moved on these rails by a lever *R*, actuated by an air cylinder *S*, controlled by solenoid operated valves. The arrangement is such that the door assembly is carried by the shuttle into the machine and positioned over the support block (*D*, Fig. 5) of the lower tool, which is then raised to lift the work to the electrodes of the upper tool. After welding has been completed, the door assembly is automatically discharged on to rollers, at the rear, which are similar to those at the front of the machine. At the time of the visit during which the information for this series of articles was obtained, the door assemblies were transferred manually from the rear of the machine to a chain conveyor. It was planned, however, to install an automatic lifting arrangement to pick up the assemblies from the rollers and hook them on the conveyor hangers.

From the Languepin multi-point spot welding machine, each door assembly is transferred to a single-point spot welder whereby six welds are made to complete the welding around the window opening. Rear doors are then loaded on to the hangers of a storage conveyor, which circulates above the section. This conveyor is more than 5,000 ft. long and has capacity for storing 3,000 doors.

Front doors are delivered to either of two special forming presses built by SIMCA, whereby the flange at each side is bent inwards. Inner and outer door panels are produced with the flanges at either side bent initially to an included angle of 110 deg. to the panel faces. When the panels are assembled, the flanges nest one inside the other, a double thickness of metal being thus provided at the edges. After the bending operation on the SIMCA presses, the flange edges are set, at an included angle of 70 deg. to the panel faces.

Fig. 7 shows one of the SIMCA presses, and each has a main structure, fabricated by welding from steel plate, with a face at the front inclined at an angle of approximately 15 deg. On this face, at the left-hand side, is mounted a forming unit *T*, which is fixed in position. This unit has a main body, of inverted-L section, that houses a sliding blade. At the right-hand side of the press there is a similar unit *U*, which is arranged to pivot, and can be swung outwards to the position shown, to facilitate loading. This unit incorporates a second sliding blade, as seen at *V*, and the blades of both units are moved towards and away from the press frame by hydraulic power. The swinging motion of the right-hand unit is effected by a hydraulic cylinder within the main structure. The blades are shaped to suit the profile of the door at each side, and each is of stepped form, with an angular shoulder between the two step faces.

With the unit *U* swung outwards, and both blades moved away from the main structure of the press, a door assembly is loaded so that its outer panel rests on supports at either side of the inclined face (as indicated at *W*) and its bottom edge contacts the brackets *Y*. A micro-switch is mounted on this inclined face and unless a door assembly is in position, this switch remains open, and the press cannot be operated. After loading an assembly, a pedal switch is tripped, and the unit *U* then swings inwards to the working position. A second micro-switch is then closed, and the two blades are moved inwards, in succession. During the movement of each blade, the angular shoulder face bends the flange of the associated edge of the door to an included angle of 70 deg.

After the edge-bending operation, front doors are loaded on to the storage conveyor. It may be mentioned here that the workers in the sections of the department so far described produce doors of one type only each day. The section operates on two shifts and 1,400 doors are made per day. Doors of all four types are stored on the overhead conveyor, which feeds the next section.

This section comprises four parallel scurfing and finishing lines, some of which are seen in Fig. 8. For each line there is a floor-mounted slat conveyor, and on every sixth slat is fitted a work-support fixture, embodying a universal ball joint. The tiltable member of the ball joint carries a platen with projections and flanges to locate and steady the door assembly, and the latter is retained in position by means of a toggle-type clamp, as indicated at *X*. This clamp is bolted to a bracket fitted to the under-side of the platen, and the clamping arm swings through an opening in the platen to engage the workpiece. The arrangement is such that the door assemblies can be readily tilted into the most convenient positions for the scurfing operations that are to be performed, and these operations are carried out with the aid of portable electric power tools. Supports, made from bent and welded steel rod, are fitted to intermediate slats of the conveyor, to hold the tools when the work is being repositioned.

From the ends of the conveyorized lines, the door assemblies are transferred to a chain conveyor,

Fig. 7. This special purpose press has been built by SIMCA and provides for bending the flanges at the sides of each door to an included angle of 70 deg. The right-hand bending unit swings outwards to facilitate loading

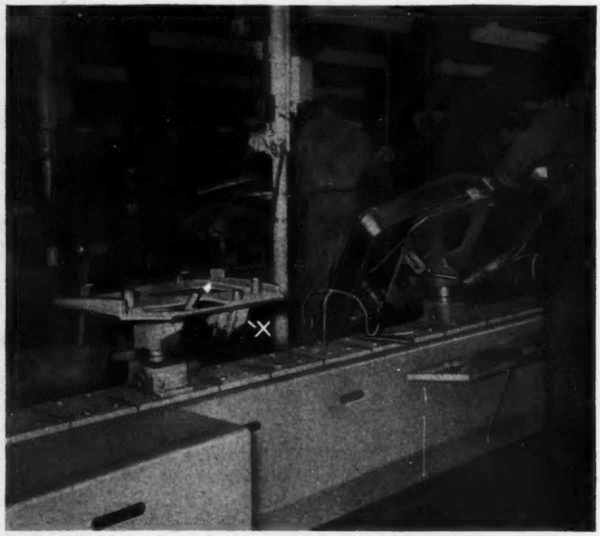


Fig. 8. Part of the four parallel finishing lines for doors for the Aronde car. Work-support fixtures with universal joints are mounted on the slat conveyors

whereon they are delivered to the body-building line, as already described.

ROOF PRODUCTION

A roof assembly for an Aronde car incorporates two principal components, one of which—the larger—comprises the roof proper, also the side members and the lower cross member of the windscreen surround, all formed as one integral pressing. At the end remote from the windscreen, this pressing provides the upper edge of the rear window surround, but the side members and lower cross member of this surround are formed by the smaller main component. The larger pressing incorporates a strut between the upper and lower edges of the windscreen opening, which serves to strengthen it before the various reinforcing members are welded in position, thereby reducing distortion, and this strut is removed at an intermediate stage in the operation sequence. These larger pressings are brought to the sub-assembly section at the starting end of the roof finishing line (*V*, Fig. 2) supported on special trolleys. Each trolley has two horizontal arms that pass through the windscreen openings of a stack of pressings, which hang downwards.

The pressings are delivered to an area adjacent to the welding jig shown in Fig. 9, and in this illustration the strengthening strut in the windscreen opening can be clearly seen. This jig is employed for welding a reinforcing member to the upper portion of the rear window surround, and it is therefore inclined so that the operator can adopt a comfortable stance. Supports are provided for the work along the two side edges, as at *A*; at the upper corners of the windscreen surround; for the side members of the windscreen; and for the rear end of the pressing. Air operated

Fig. 9. The welding jig in the roof sub-assembly section which is used for holding the main roof pressing while a reinforcing channel is welded to the upper edge of the rear window surround

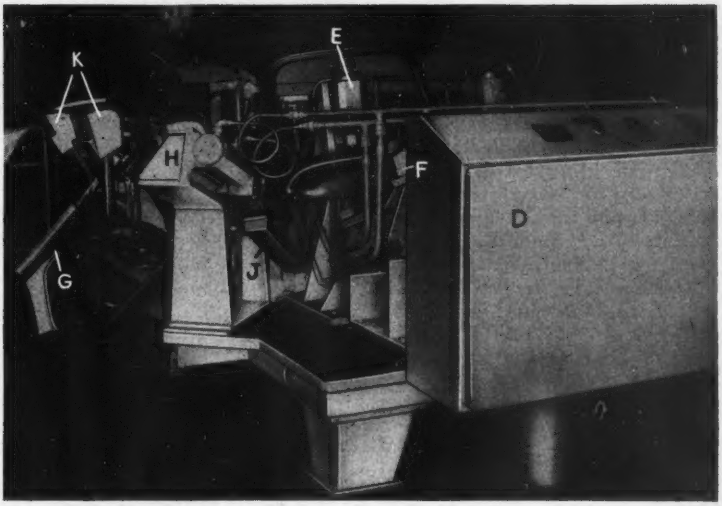


Fig. 10. This floor-mounted, hydraulically-operated fixture provides for piercing holes in the front cross member of the main roof pressing, also for trimming the joint areas of this pressing and of a smaller pressing that completes the rear window opening

clamping arrangements, as at *B*, are incorporated for the rear end of the pressing, and the front end is held against the locations by toggle clamps, as at *C*.

A reinforcing member is placed in position before the air clamps are applied, and these units are controlled by a foot-actuated valve. The operator then welds the reinforcing member to the main roof pressing, using a hand-held spot welding unit, the weight of which is supported by cables from two self-coiling reels, attached to an overhead framework. Current for the welding unit is supplied from a transformer mounted within the jig structure.

From the welding jig, the roof pressings are transferred to a floor-mounted piercing and trimming fixture. Shown in Fig. 10, this fixture is completely self contained, and incorporates a number of hydraulically-operated punch and die assemblies, which are supplied with pressure-fluid from the pump and reservoir unit *D*. There are two punch and die assemblies as at *E*, which pierce holes in the front cross-member of the pressing to provide for the passage of the windscreen wiper shafts. Each of two assemblies at the front of the fixture, behind the pump and reservoir unit, provides for piercing four holes in the front of the cross-member, for the attachment studs of a windscreen wiper motor. One of these assemblies is just visible at *F*.

Reference has already been made to the smaller main component of the roof sub-assembly, and

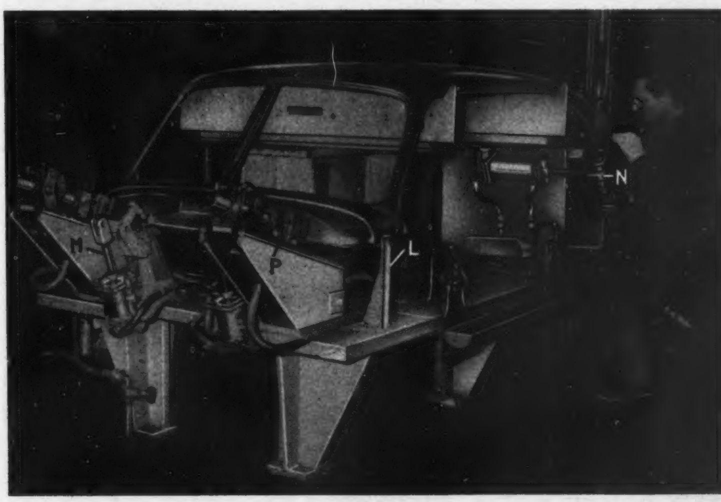


Fig. 11. The jig for holding the main and secondary pressings of the roof sub-assembly while the joints at either side are oxy-acetylene welded. Hydraulic units at the front serve for piercing two groups of holes

one such component is seen at *G*. To ensure accurate matching of the joints between the roof sub-assembly and under-body, both the main pressings are loaded into the fixture, and their joint faces are trimmed by hydraulic cropping units. There are two of these units at each side of the fixture, and the unit for trimming the left-hand front joint face (as viewed in Fig. 10) is indicated at *H*. Scrap material from the trimming operation falls into a chute *J*, and is directed into a container within the fixture frame.

All the hydraulic units of the fixture are controlled from two stations *K*, which are so located that the operators must be clear of the fixture and must use both hands. It may also be observed that the stations are fitted with shrouds to prevent accidental operation.

WELDING AND PIERCING JIG

After the piercing and trimming operations, the two roof pressings are passed to either of two identical welding jigs, one of which is shown in Fig. 11. The locations at the rear end provide for positioning the smaller pressing correctly in relation to the main roof panel, the previous trimming operation ensuring that the joint edges are correctly matched. At the front of the jig, there are supports, as at *L*, which are engaged by the trimmed joint edge at either side of the front cross-member of the main panel, and the roof portion of the pressing is supported on two transverse beams. The two components are secured in position by air-operated clamps, as at *M* and *N*, which are of the simple direct-acting lever type. With the pressings supported and clamped, the joints between the two components at the rear are oxy-acetylene welded by hand.

The jig also provides for piercing two groups of holes at the front of the cross-member of the larger pressing, one group serving for the attachment of the engine serial number plate, and the other for the body number plate. These holes are pierced by hydraulically-operated punch and die assemblies, one of which is indicated at *P*. Each assembly is carried on an inclined, weld-fabricated bracket, and the operating cylinder is mounted between the bracket side walls. The piston rod of the cylinder is coupled by two linkages to the cylindrical ram that carries the punches, and a spring-loaded stripper plate is fitted.

From the welding and piercing jig, the roof sub-assemblies are transferred to either of two stations where the welded joint at the rear is dressed. These stations are equipped with jigs of tubular construction, and dressing is carried out with air-operated portable tools.

Roof sub-assemblies are next passed to a further spot-welding station for the attachment of reinforcing inner frames to the windscreen and rear window surrounds. Fig. 12 shows the jig at this station, and it will be observed that there are three operators, two of whom carry out the spot-welding operations at the rear of the assembly (to the right in Fig. 12). The remaining operator is responsible for spot-welding the front reinforcement. Air-actuated clamps are provided internally and externally at the front end of the jig, but the clamps at the rear end are of the hand-operated toggle-lever type.

Loading of the reinforcing frames and the previously-welded sub-assembly is undertaken by two of the operators, and during this stage, the third operator pierces a number of holes for the subsequent attachment of lining

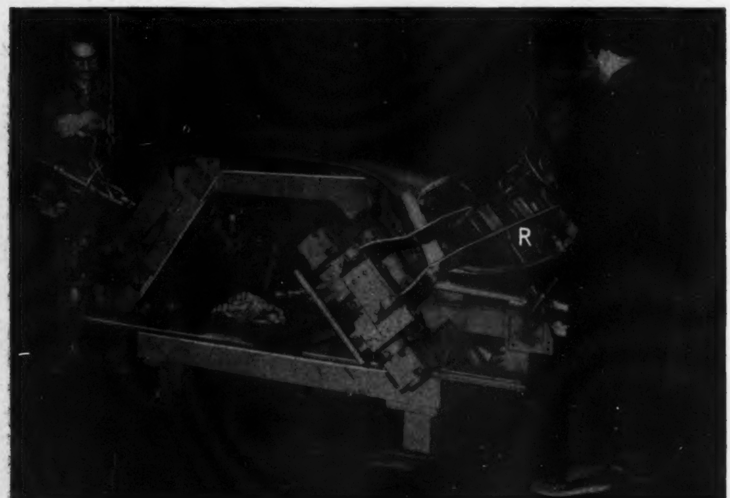


Fig. 12. The jig employed for holding the roof sub-assembly while reinforcing frames are assembled and welded to the windscreen and rear window surrounds

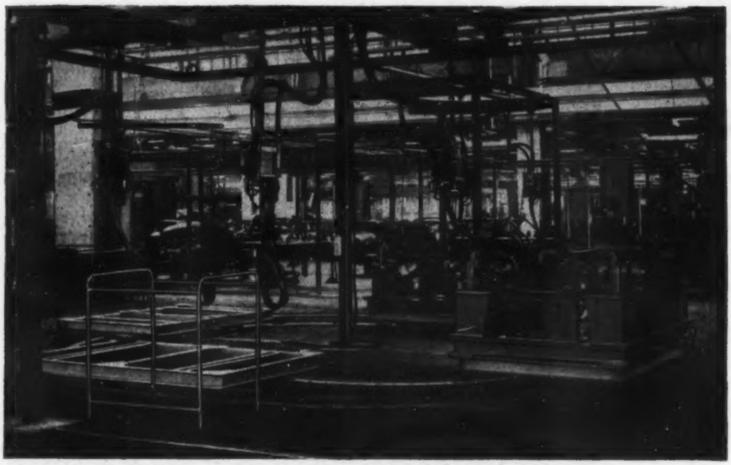


Fig. 13. View of the roundabout for final welding operations on roof sub-assemblies for the Aronde car. Four trolleys move on a track, and are fitted with welding jigs, two of which are seen in position

material to the main roof component, using a press at one side of the station. At the front and rear of the welding jig, there are heavy-duty swinging members, as at R, which engage the inner reinforcing frames to locate them correctly relative to the main sub-assembly. To prevent distortion, these swinging members are retained in the position shown until the inner reinforcing frames have been tack-welded to the windscreen and rear window surrounds, but are then swung outwards, clear of the working zone, to permit unrestricted access for completion of the spot-welding operations.

Roof sub-assemblies removed from the jig are transferred to inclined racks, and the sub-assemblies for 4-door cars pass to the loading position of a "roundabout" equipped with trolley jigs, whereon further assembly and spot-welding operations are performed. Sub-assemblies for 2-door cars are transferred to a series of single-station jigs, which provide for similar operations, and are located at one side of the department. While the sub-assemblies are suspended from the inclined racks, the reinforcing strut in each windscreen opening is removed by an operator, using hand shears.

ROUNDABOUT FOR WELDING OPERATIONS

Fig. 13 is a general view of the welding roundabout for roofs for 4-door cars. A closed loop of conveyor chain runs in a guide channel, which, in plan, takes the form of a square with short straight sides and large rounded corners. The channel is supported on brackets, anchored to the shop floor, and on either

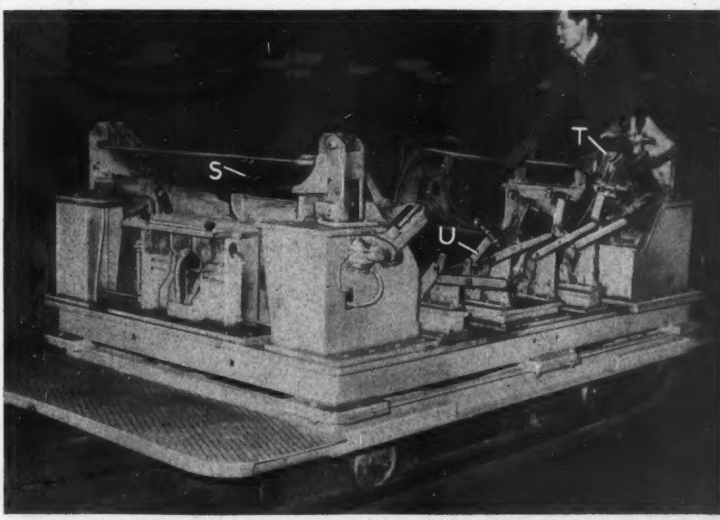


Fig. 14. One of the trolley-mounted jigs for the final welding operations on roof sub-assemblies. Manually-operated and pneumatic clamps are used, and the air supply is connected by means of a quick release coupling which is provided at the loading station

side of it there are steel tracks for the trolleys whereon the welding jigs are mounted. There are four trolleys, and in Fig. 13, jigs are mounted on only two. A framework of steel sections, supported on stanchions above the roundabout, serves to carry the runners from which the SIMCA-built spot-welding units are suspended, also the associated Sciaky welding transformers.

One of the trolley jigs is seen in Fig. 14, and it will be noted that the roof sub-assembly is loaded in the inverted position. A combination of pneumatic and manual clamping is employed, and the pneumatic clamps are of the self-sustaining type, the compressed air supply being connected to each trolley jig, by means of a hose with a quick release coupling, as it reaches the unloading and loading station. After the roof sub-assembly has been located in the jig, a reinforcing cross-member is assembled behind the cross-member of the windscreen surround. The reinforcing member has two groups of four studs, welded to its front face, and these studs (as may be seen at S) pass through the holes pierced on the hydraulically-operated fixture, Fig. 10. When this member has been assembled, the air clamps are applied, and those at the front end of the fixture serve to hold the reinforcement in position at each end, in addition to securing the roof sub-assembly.

Fig. 16. At the end of the finishing line there is a conveyorized infra-red oven for the application of bituminous sound-deadening material to the interior of the roof panel

Side reinforcements for the upper portion of the door opening are prepared in a section at the side of the roundabout, which is equipped with a multipoint spot-welding machine. These reinforcing members are fed to the loading station of the roundabout, and one is assembled to each side of the main roof sub-assembly, the end of such a member being indicated at *T* in Fig. 14. As the trolley moves from the loading station, the five toggle clamps (as at *U*) at each side of the jig are applied to secure the reinforcing member in position.

There are two operators at each station of the roundabout, and at the first station, the front and side reinforcing members are tack-welded in position. Welding is completed at the second station, and at the third, a gusset plate is assembled to each front corner of the roof, and secured by oxy-acetylene welding.

Fig. 15. A view of the starting end of the finishing line for roof sub-assemblies, showing the welding of roof gutters with Sciaky portable seam welding tools

ROOF FINISHING LINE

When each trolley jig returns to the unloading/loading station of the roundabout, the roof sub-assembly is released, and is transferred to a chain conveyor, whereby it is delivered to the head of the finishing line (*V*, Fig. 2). This line has a double chain conveyor track, which is raised above floor level so that the work is at a convenient height for the operators at each side. A view of a station at the head of the conveyor is given in Fig. 15, and the supporting arrangements for the work may be seen. Beams spanning the conveyor chains are fitted with steel fork pieces, and the roof sub-assemblies are loaded so that the cross-members at the front and rear rest in pairs of forks.

Fig. 15 also shows the first operation performed on the line, which provides for seam welding along the gutter at either side of the roof. Sciaky portable welding equipment is employed, and each unit has two disc-type electrodes, one of which is traversed along the inside of the channel section of the gutter, the other being thrust into contact with the flange around the door opening. The welding units are suspended from self-coiling reels attached to framework at each side of the line, and this framework also supports the associated transformers Similar supporting arrangements are provided along the remainder of the line for the portable electric tools employed for the scurfing and dressing operations, which are carried out at the remaining stations.

The end of the finishing line adjoins a second conveyor which passes through a large infra-red oven. Roof sub-assemblies are loaded on to this conveyor in the inverted position, as may be seen in Fig. 16, and are supported by formed lengths of steel rod, as at *V*, which are welded to brackets on the cross-beams of the twin conveyor chains. These lengths of rod are engaged by the roof gutter, at either end, and the curved portions of the rods roughly locate the roof sub-assembly endwise.

Before the sub-assemblies enter the oven, sheets of bituminous sound-deadening material are placed on the interior surface of each roof panel, as may be seen at *W*. During the passage of the sub-assemblies through the oven, the material softens and adheres to the panels. The sub-assemblies are allowed to cool on the conveyor beyond the oven, and are then unloaded and transferred to the *berceau,* as has already been mentioned.

Operations on other body sub-assemblies will be considered in a further article in this series, to be published shortly in MACHINERY.

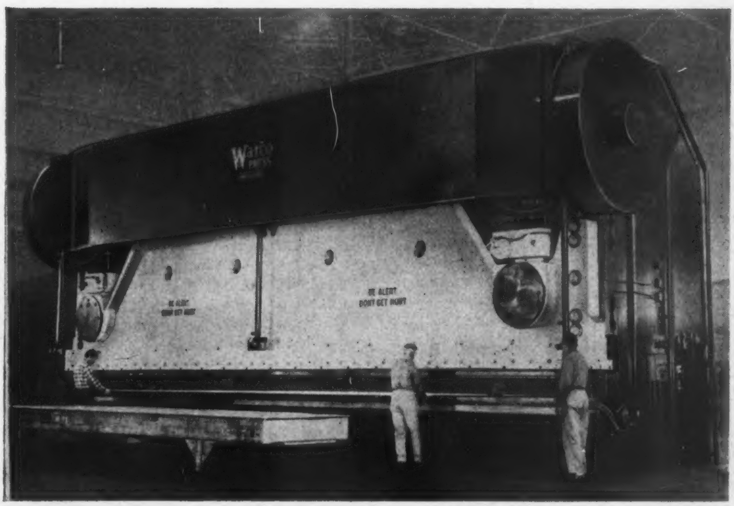
Warco 1,000-ton Press Brake

In the accompanying figure is shown a welded-steel, double back-geared, twin-drive press brake, of 1,000 tons capacity, which was designed and built by the Warco Division of the Federal Machine & Welder Co., Warren, Ohio, U.S.A., for one of the leading aluminium companies.

The welded steel frame components are keyed and bolted, and the bed, slide, and crown are of box construction.

Stated to be among the largest of its type yet built, the machine has a 41-ft. long ram slide with a face width of 6 in., and the stroke is 9 in. Individual adjustments can be made to the ram connections, for forming tapered parts.

The operating speed is 12 strokes per min., and the drive is transmitted through a Warco pneumatically-operated clutch and brake unit arranged for electrical control.



Warco 1,000-ton press brake built by the Federal Machine & Welder Co.

New Red Ring Inspection Equipment for Gears

In the accompanying illustrations are shown some recent additions to the Red Ring range of inspection equipment for gears made by the National Broach & Machine Co., Detroit, Michigan, U.S.A. Precision Gear Machines & Tools, Ltd., Red Ring Works, Bodmin Road, Coventry, is an associate company of the National Broach & Machine Co., and was established for the purpose of manufacturing and selling Red Ring products.

On the rolling gear testers, type GRH, shown in Fig. 1, and type GRJ, in Fig. 2, the master gear is mounted on a shaft which can swivel on a ball-bearing pivot, and is held in mesh with the gear to be checked by an adjustable spring. The minimum centre distance obtainable between the master gear and the workpiece gear is 1⅜ in., and the maximum distance is 12 5/16 in. on the type GRH tester, and 12 11/16 in. on the type GRJ. A motor drive can be provided, to ensure that the gears are rotated at a constant speed, and when checking is in progress, movements of the shaft which carries the master gear, resulting from errors in meshing, are shown on a large-diameter dial indicator.

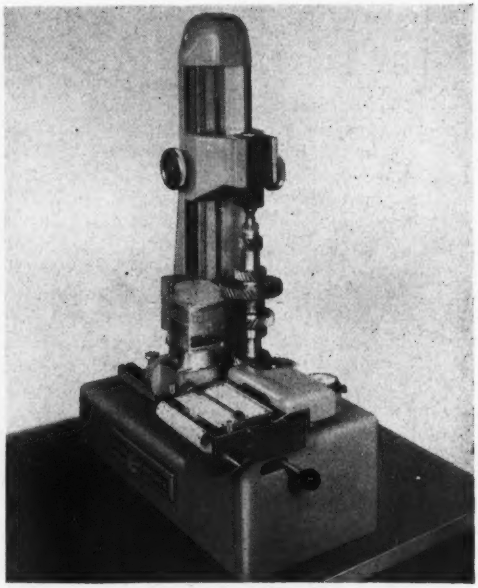


Fig. 2. The Red Ring type GRJ rolling gear tester is here shown set up for checking one element of a cluster gear

Fig. 1. Red Ring type GRH rolling gear tester

Intended for checking gears with integral shafts, the type GRJ tester is shown fitted with a new recording unit of the paper strip type, which can be brought into operation when the master gear is driven at a speed of about 4 r.p.m. A recording unit of similar design can be provided for the type GRH tester, and both instruments can be fitted with signal lamps which are automatically lit when the movement of the shaft which carries the master gear exceeds the maximum permissible amount. The type GRJ tester is shown set up for checking one element on a cluster gear, and the column, which carries the tailstock for supporting the upper end of the work, can be adjusted in a T-slot in the base to give the required centre distance between the master gear and the workpiece. Other types of work

support arrangements can be provided to suit requirements.

AN INVOLUTE TESTER FOR GEAR SHAVING CUTTERS

The type PCB involute tester shown in Fig. 3 is particularly intended for checking gear shaving cutters with base circle diameters from 5 to 13 in., to a high decree of accuracy. The stylus finger on the measuring head can be swivelled through 180 deg., and deviations from the nominal involute shape on both flanks of each tooth on the cutter are shown on separate large-diameter dial indicators. When checking is in progress, a straight-edge on the roller-mounted slide which carries the measuring head is traversed in contact with a base circle disc, and the amount of movement is shown on a dial type indicator. An electronic recording unit of the rectilinear type is fitted, which enables graphs of both flanks of three cutter teeth to be marked side-by-side on 6-in. wide paper strip. The length of the chart in relation to the traverse movement imparted to the measuring slide, is in the ratio of 10 to 1. The work-head can be adjusted in rectangular-section guideways on the base, and the gear to be checked is accurately located by a ball-bearing bush on the spindle, and is secured by a spring-loaded C-washer.

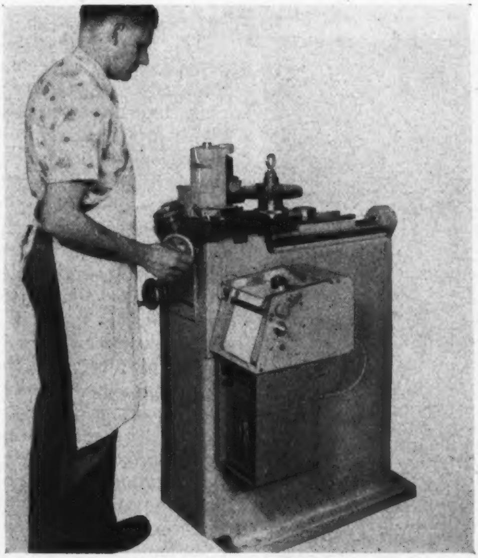


Fig. 3. Red Ring type PCB Involute tester for gear shaving cutters

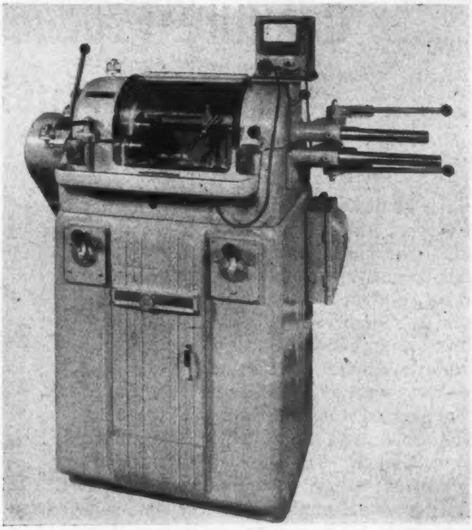


Fig. 4. Red Ring type GSC gear speeder fitted with a microphone, an amplifier, and a dial-type meter

GEAR SPEEDER WITH A NOISE INDICATOR

In Fig. 4 is shown a type GSC 10-in. gear speeder, fitted with a microphone, a broad-band amplifier, and a dial-type meter, instead of the horn which is usually provided, to facilitate checking gears for noise when they are run in mesh. The machine should be operated in surroundings which have a lower ambient noise level than that expected for the gears to be tested. For setting up, two master gears are run in mesh, and the meter is adjusted to give a reading, which corresponds to the resulting noise level.

It should be noted that the type GSC gear speeder described above will not be available for supply through Precision Gear Machines & Tools, Ltd., until July 1, 1961.

A THERMIONIC EMISSION ELECTRON MICROSCOPE, it is reported, has been developed by the Physics Department of the General Motors Research Laboratories, Detroit, U.S.A., to permit observation of the behaviour of metals at high temperatures. Samples can be observed, at 3,000 × magnification, on a viewing screen, as they are heated in a built-in furnace, and changes in microstructure at different temperatures can be noted.

Quantity Production of Laminations for Transformer Cores

LAMINATIONS FOR TRANSFORMER CORES, in a wide variety of sizes and designs, are being produced in large quantities by the Transformer Department of Ferranti, Ltd., Hollinwood, Lancashire, with the aid of a special fully-automatic installation which has recently been put into operation. The equipment, of which a general view from the delivery end is shown in Fig. 1, is akin to a transfer press and has an overall length of 60 ft. It was designed and developed by Ferranti, Ltd., and the press sections were supplied by A. Kinghorn & Co., Ltd., Todmorden, through their principals Rushworth & Co. (Sowerby Bridge), Ltd., Yorks., and to Ferranti specification. The associated feed mechanism and press automation were supplied, to Ferranti specification, by Humphris & Sons, Ltd., Poole, Dorset, and the tooling was built by The Norbury Engineering Co., Ltd., Hyde, Cheshire. Ferranti, Ltd., supplied all the remaining auxiliary equipment.

The special cold-rolled grain-orientated steel employed for the laminations is fed to the installation from coil, having been cut to the required width on the special rotary slitting machine shown in Fig. 2. Coil stock is fed from a unit behind this machine (not shown) and after passing through the slitting knives it is re-coiled on the unit seen in the left foreground. This equipment will handle coil stock in reels weighing up to 3 tons, and with widths from 3½ to 36 in., and a maximum of eight separate strips can be cut at one pass.

Coils of steel of the required width are transferred to the Humphris uncoiling unit seen in Fig. 3, which is a close-up view from the entry end of the installation. The leading end is taken from the coil and is passed over and under the swinging roller A, and thence to the feed roller unit in the background. At this stage, the installation is under the control of a foot-operated switch, and the leading end of the strip is fed through until it is just beyond the first press tool. This tool is then operated, to pierce a number of holes and to crop the leading end at an angle of 45 deg. The scrap from the latter operation is then removed, and the control of the machine is transferred to "automatic".

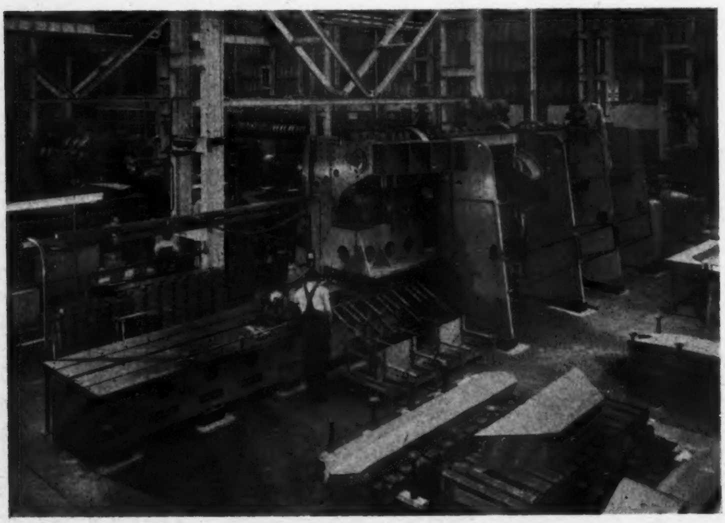


Fig. 1. General view, from the delivery end of equipment installed in the Transformer Department of Ferranti, Ltd., Hollinwood; for the quantity production of laminations for transformer cores

The strip is then advanced over the second set of piercing and cropping tools to trip the hydro-pneumatic press shown on the bed extension in Fig. 4. This unit provides for applying a back-tensioning action to the strip, as will be explained later, and serves to operate the main press. At this stroke, the first tool pierces holes in the blank portion of the strip and a cropping tool severs it from the stock. The second tool simultaneously severs the leading lamination from the strip, and with this arrangement, two complete laminations of regular 45-deg. trapezium form are produced for each stroke of the

Fig. 2. This rotary slitting machine trims the coil stock to the required width for use on the installation shown in Fig. 1

machine. It is arranged that the leading lamination is delivered to the left-hand side of the machine, looking in the direction of transfer, and the second lamination to the right-hand side.

A close-up view of the second press station is shown in Fig. 4. As the leading end of the stock passes beneath this tool it interrupts the beam of light from the transmitter *B*, which is part of a photo-electric cell system. As it approaches this beam, the strip is being fed at the rate of 200 ft. per min., but when the beam is obstructed the feed rate is automatically reduced to 6 in. per min. The strip proceeds at this rate until the leading end strikes a micro-switch housed within the special pneumatically-operated punch unit *C*. This unit serves to punch a small-diameter "anchor" hole, near to the leading edge of the strip, and the punch slide is arranged to stop in the downward position, so that the tool remains in engagement with the material.

Operation of the unit *C* also serves to close circuits whereby the main feed rolls are opened, to release the strip, and another pair of rollers is closed, to grip it. This latter pair of rolls is arranged to be driven in the opposite direction, as compared with the feed rolls, and as a result the strip is pulled lengthwise, in tension, against the punch in the unit *C*, which acts as an anchor. This lengthwise tensioning serves to remove any undulations in the stock, and is continued until a clutch unit in the drive to the tensioning rolls starts to slip. This latter slip serves to actuate a

Fig. 3. Close-up view of the Humphris uncoiling unit at the entry end of the lamination machine

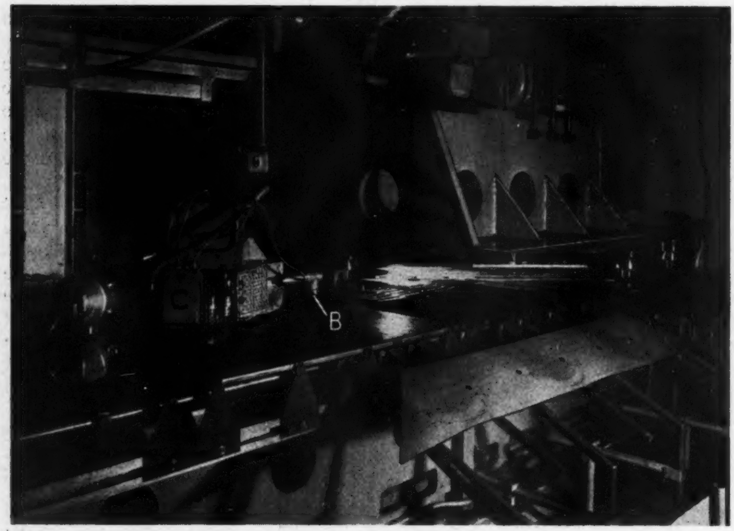


Fig. 4. In this close-up view of the delivery end of the installation, a finished lamination is seen being discharged from the final press tool

hold-down ram in the feed roll assembly, which grips the strip and maintains the lengthwise tension. The reverse drive rolls are then brought to rest and are returned automatically to the idle position.

The press tools are then lowered, to perform the piercing and cropping operations described above, and as they rise the punch in the unit *C* is also withdrawn and ejector mechanisms are actuated. As a result, the laminations are delivered from the machine as described previously. A lamination which has just been ejected can be seen in the right foreground in Fig. 4, and the arrangement is such that it slides down a number of inclined cylindrical bars.

From the ends of the bars, the lamination falls flat, on to a wooden pallet, and when a stack has been built up, the pallet is removed and a fresh unit is substituted. A number of these wooden pallets, with stacks of laminations in position, can be seen in the temporary storage area in the foreground in Fig. 1.

Another photo-electric cell system is employed in connection with the uncoiling unit seen in Fig. 3. As the stock is drawn into the machine by the feed rollers, the swinging roller *A* moves in an anti-clockwise direction, and is thereby removed from the path of a beam of light from the unit *D*. As a result, a circuit is completed to start the drive motor of the un-coiling unit, and more stock is delivered from the coil. Consequently, the arm *A* swings back to the position shown, and the beam of light is interrupted, thereby stopping the motor of the uncoiling unit.

It may be noted that this installation for piercing and cropping laminations also includes provision for the removal, by grinding, of burrs, caused by these operations. An important advantage offered by this installation is that the various press operations are located in relation to the centre line of the strip, which is coincident with the centre line of the finished core assembly. With this arrangement, any manufacturing errors are halved, instead of being displaced to one side as was the case when—with the method employed hitherto—pre-cut blanks were located in the press tools from two mutually perpendicular edges. As a result, a considerable increase in the accuracy of the finished laminations has been obtained.

ZIRCON MOULDING SAND.—A recent issue of *Firth Brown News* includes an abridged version of a prize-winning paper delivered by Mr. B. W. Midgley to the Lincolnshire Iron and Steel Institute, and it is interesting to note that zircon sand is now being used almost exclusively for moulding castings between 1 and 7 tons at the Scunthorpe foundry of Thomas Firth and John Brown, Ltd. It is stated that steel castings are removed from the moulds more easily, and in a much cleaner condition, being almost entirely free from adhering sand.

Although zircon sand is more expensive than the Sheffield Compo it replaces, an advantage is gained from the fact that it can be employed in layers only about ⅛th as thick as are required when Compo is used. Zircon can be stoved at 200 deg. C., as compared with 500 deg. C. for Compo, and savings result from the elimination of the heavy chipping and dressing which are required to clean-up castings which have been poured in Compo moulds.

Transistor Production in Japan*

Methods Employed by the Tokyo Shibaura Electric Co., Ltd.

By R. E. GREEN, Associate Editor

ONE OF THE LARGEST companies engaged in electrical manufacture in Japan at the present time is the Tokyo Shibaura Electric Co., Ltd., whose head office is at 2, Ginza Nishi 5-chome, Chuo-ku, Tokyo. This company had its origin some 86 years ago, when a small workshop was established in Tokyo by Hisashige Tanaka, for the manufacture of Henry-type telegraph instruments. The business, later known as Shibaura Engineering Works, continued to develop and expand, and in 1939 it was merged with the Tokyo Electric Co. and the present title was adopted. This title has since been popularly shortened to Toshiba, which is one of the firm's trade marks.

Some years prior to the merger, the Shibaura Engineering Works had built a large factory at Tsurumi on the edge of Tokyo bay, about half-way between Tokyo and Yokohama. Great damage was caused to these works by bombing, but recovery after the war was comparatively rapid, and by 1947 the factory was capable of producing a 1,000-h.p. Koepe-system electric winding machine for mining operations. By 1959, the company had a capital of about £25 million and a total of 19 factories and was engaged in the manufacture of almost every type of electrical machine and appliance from transistors to generators weighing up to 100 tons.

In addition, the company maintains two research laboratories, one engaged in work on heavy-current machines, and the other on light-current appliances and instruments. Some 40,000 people are employed, and the value of the company's products is about £90 million per year.

In addition to its own plants, the company controls those of more than 50 other firms concerned with many fields of activity, and has technical collaboration agreements with 16 manufacturers in Great Britain, U.S.A., West Germany, France and the Netherlands.

TOSHIBA TRANSISTOR WORKS

As is widely known, the growth in application and in the numbers of transistors produced in Japan, since they were introduced in the U.S.A. in

* Articles on the Japanese metal-working industries which have already been published in MACHINERY have been concerned with the 4th Osaka International Trade Fair, 96/1212—1/6/60 and 96/1288—8/6/60; Motor Car Production in Japan, 96/1426—15/6/60, 96/1552—22/6/60 and 96/1640—29/6/60; Bicycle Production in Japan, 97/46—6/7/60; Refrigerator Production in Japan, 97/416—24/8/60, 98/176—25/1/61; Electric Motor Production in Japan, 97/708—28/9/60, 97/1276—7/12/60 and 97/1448—28/12/60; Television Receiver Production in Japan, 97/932—26/10/60; The Machine Tool Industry of Japan, 97/108—13/7/60; Japanese Machine Tool Factories, 1. Ikegai Iron Works, Ltd., 97/304—10/8/60, 2. Okuma Machinery Works, Ltd., 97/472—31/8/60, 3. Toyoda Machine Works, Ltd., 97/652—21/9/60, 4. The Kawasaki Works of Hitachi, Ltd., 97/1048—9/11/60.

Fig. 1. The new Toshiba factory, for the production of transistors at the rate of 5,000,000 per month, is mainly of windowless construction and is air-conditioned

1948, has been phenomenal, and the manufacture of electronic equipment incorporating these devices has also expanded very rapidly. This growth has been encouraged by the Japanese Government, which saw in the industry an outlet for the inherent skill of the Japanese people. In this connection it may be noted that the output of the electronics industry in Japan in 1959 was valued at about £330 million, or some 80 per cent more than in the previous year, and it is believed that when the figure for 1960 is available it will show a further rise to about £430 million.

The Toshiba company was one of the first concerned with the development and production of transistors, which were made at their Yokosuka factory, near Tokyo, in 1956. These transistors were used in small portable radios made at the Yanagicho works, which has a capacity of more than 100,000 per month, and also produces watthour meters, refrigerators and other household equipment. In 1957, the company began the construction of a large new factory, which was specially designed for the mass production of transistors and other semi-conducting devices, and had an initial output rate of 2,000,000 per month.

A general view of this factory is given in Fig. 1, and it is built on a site near the Komukai communication and electronic equipment factory, which is seen in the background, at Kawasaki, alongside the trunk road from Tokyo to Yokohama. The site area is about 430,000 sq. ft., and the factory has four floors which provide a total of 314,000 sq. ft. Completed towards the end of 1958, the building

Fig. 2. View inside the control room for the air-conditioning plant in the Toshiba factory. Instruments provide for monitoring and controlling temperature, humidity, and the concentration of dust particles in incoming air

incorporates the most modern ideas relating to transistor production, and has no windows above the ground floor, lighting being provided by fluorescent tubes of the company's own manufacture.

All the production areas, which comprise the second, third, and part of the fourth floors, are supplied with specially-treated air in order to provide suitable conditions for the operations in progress. Under the control of the fully-instrumented semi-automatic installation in the room shown in Fig. 2, this air is pumped into the production shops from an auxiliary building placed between the wings of the U-shaped factory, by means of two 800-h.p. compressors, the plant being designed to provide a complete change of air every 15 min. Before entering the building, the air is heated or cooled to a temperature of 25 $\pm 1{\cdot}5$ deg. C. (77 $\pm 2{\cdot}7$ deg. F.), and the humidity is reduced to less than 45 per cent. Filters through which the incoming air is passed are designed to reduce the number of dust particles of a larger size than one micron (0·00004 in.) from 90 per c.c. in the outside air to 22.

Fig. 3. Typical of the equipment developed by the company for the production of transistors are these high-frequency heated, zone-refining furnaces, through which ingots of germanium and silicon are passed

From the upper floors, the out-going air passes down to the ground floor where it is circulated through the administrative offices, laboratories, and special machine building shops, before leaving the building. Entrances to each of the "clean air" production shops are provided with double doors at the ends of short narrow corridors. Only one door of each pair can be opened at a time, and jets of clean air are directed on to the clothes of entrants as they pass through the corridor to remove any loose dust particles. Special overalls, which are regularly washed by the company's laundry, are issued to all workers.

A total of about 2,800 people is employed in the factory, of whom some 72 per cent are female, mainly from 16 to 25 years of age. These girls are recruited from Tokyo and other large towns nearby, and from less densely populated districts. Girls who come from long distances are accommodated in specially-built dormitories in which they live three to a room measuring about 9 ft. square, in buildings which provide for about 530 beds. The girls are paid about £8 per month at the start of their training, and can usually double this figure by the end of the normal period of 10 years, by which time they either marry or move to other types of employment.

Two shifts of 7½ hours each are worked per day, for a 6-day week, and there is a canteen in the works where a mid-shift meal can be obtained for the subsidized price of about 7½d. The first shift starts at 5.45 a.m. and continues until 2 p.m., with a 45-min. break, and the second shift is from 2 to 10 p.m., with a 30 min. break.

PLANT AND QUALITY CONTROL

During the period when transistors were being produced in the Yokosuka factory, considerable development work was carried out on production methods and many special machines were designed and built. These machines provide benefits in two ways, of which the less important is said to be the reduction in cost which is obtained from the use of special-purpose automatic equipment. The main benefit is the improvement in the standard of quality which has been made possible by the elimination of the human element from production operations, and many of the processes in the factory are now only supervised by the workers. It may be noted that, whereas the planned output of the factory, when it was first built, was 2,000,000 transistors per month, this level was soon reached, and at present some 5,000,000 transistors, representing about 40 per cent of Japan's total output, are made per month.

Most of the design and development work on

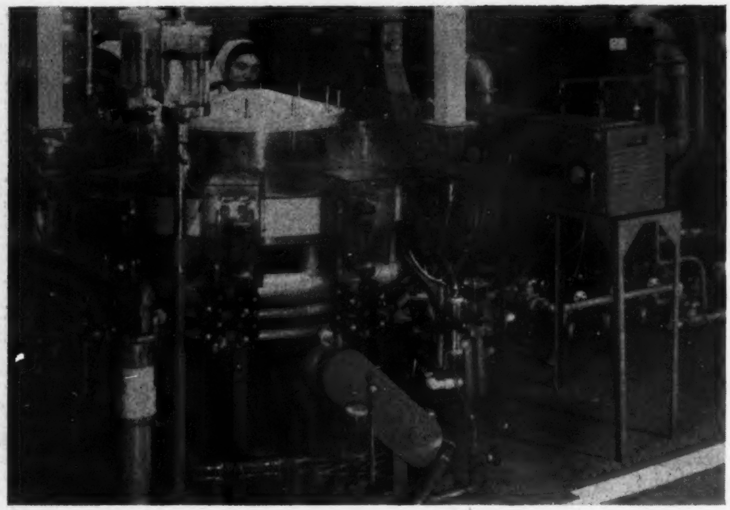


Fig. 4. This special machine is designed to perform etching and rinsing operations on germanium wafers on a semi-automatic cycle, supervised by the operator seated at the far side

special machines and processes is undertaken on the ground floor, to which earlier reference was made. Here some 85 people are employed, including 17 graduate engineers, in an area of about 10,000 sq. ft. The factory administration also includes a large quality control organization which covers every stage of production from raw material through the manufacture of parts to their assembly into complete transistors. So high are the requirements for reliability in the completed product that it is now found that further improvements can only be achieved by the use of more and more fully automatic machines.

In addition to the sections concerned with the design of special plant, laboratories—including a low-temperature laboratory in which temperatures down to −270 deg. C. can be obtained—are provided on the ground floor. Here, new types of transistors and semi-conducting devices are developed, including thermistors and photo-transistors for entertainment and industrial applications of various types.

PRODUCTION OF TRANSISTORS

Because most of the special-purpose plant is of original Toshiba design, the company is not willing to allow detailed descriptions to be published, and the following references are therefore necessarily brief. In general, the methods employed for the production of transistors do not differ noticeably from those employed in the West, since the raw materials and the end products are so similar. Zone refining methods are employed for germanium and silicon, and typical furnaces for this operation are seen in Fig. 3, the process being semi-automatic. The metal is carried through induction heating coils which produce molten zones wherein impurities are suspended, and thus caused to migrate to one end of the ingot.

After the ingots have been re-melted and subjected to a "crystal-pulling" process which produces the required crystal orientation, they are

Fig. 5. Part of a row of 10 thickness sorting machines in which germanium wafers are checked for thickness and sorted into 10 grades within the tolerance of 9 microns

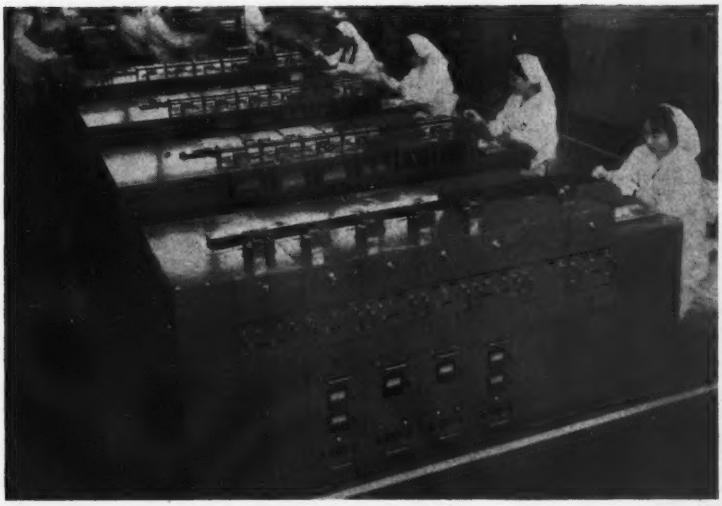


Fig. 6. In these transfer testing machines, transistors, introduced at the right-hand end, are carried automatically to various testing positions and rejected into chutes at the sides if they are defective

sliced on special machines, with the aid of diamond-impregnated wheels, to obtain wafers of various thicknesses according to the requirements of the transistors to be made. Lapping machines are employed to reduce the thickness of wafers, and they are also etched to obtain further thickness reduction, and to smooth the surfaces, on special machines of the type shown in Fig. 4. This machine performs a controlled cycle of etching and rinsing operations on wafers which are fed in by the operator seen seated at the far side of the machine structure.

Fig. 7. This semi-automatic press, for the assembly of transistors to their protective caps, is tended by two operators, and has a cycle time of 7 sec.

Wafers are subsequently sorted into thickness grades, within an overall tolerance which may, for example, be 9 microns (0·00036 in.). Wafers within this tolerance are divided into grades on fully automatic machines of the type seen in Fig. 5. The wafers are fed from a hopper, one at a time, and pass beneath a gauging head, which determines the setting of shutters in a receiving chute, at the rate of 40 per min. Wafers of similar grades are thus segregated, and counters on the front of the machine record the number of each size. The grades are separated by steps of 1 micron (0·00004 in.), and compartments are also provided for wafers which are too thick and too thin to be acceptable. There are ten similar machines in the row illustrated, which is one of several in the factory.

Alloying operations, whereby a pellet of indium is placed on one or both sides of the wafer and melted into it are also performed on special automatic machines, and testing is subsequently carried out to check the electrical characteristics, on equipment such as that shown in the heading illustration. Automatic transfer testing machines are used at a later stage, as shown in Fig. 6, for checking the assembled units. Transistors are fed in at one end of such a machine and carried automatically to a number of stations at which different tests are performed. Those transistors which fail to pass a particular test are ejected automatically into chutes alongside the testing position.

Most of the transistors produced by Toshiba are enclosed in caps or containers drawn from German

silver sheet material, coated with cold solder, and this operation also is performed on special machines, one of which is seen in Fig. 7. This machine operates on a 7-sec. cycle, and two seated operators are employed to load the caps and the transistor assemblies into fixtures carried on the automatic indexing table. On the table, the assemblies are carried past an automatic press, the operations of which are synchronized with the indexing movements.

Articles describing methods and equipment employed in other Japanese metal-working plants, including the factories of machine tool builders, will be published in forthcoming issues of MACHINERY.

Scrivener Loading Attachment for a Centreless Grinding Machine

To avoid the risk of workpieces being accidentally dropped between the wheels on a centreless grinding machine during manual loading and unloading, Arthur Scrivener, Ltd., Tyburn Road, Birmingham, 24, have equipped one of their No. 3 grinders with an attachment which enables these operations to be performed at one side of the grinding zone. This attachment may be seen in the close-up view Fig. 1. The set-up is employed for plunge-grinding, simultaneously, surfaces at both ends of the worm-shaft illustrated in Fig. 2, the machine being fitted with twin grinding and control wheels.

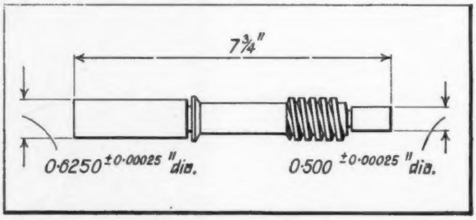


Fig. 2. Surfaces at both ends of this worm-shaft are ground simultaneously

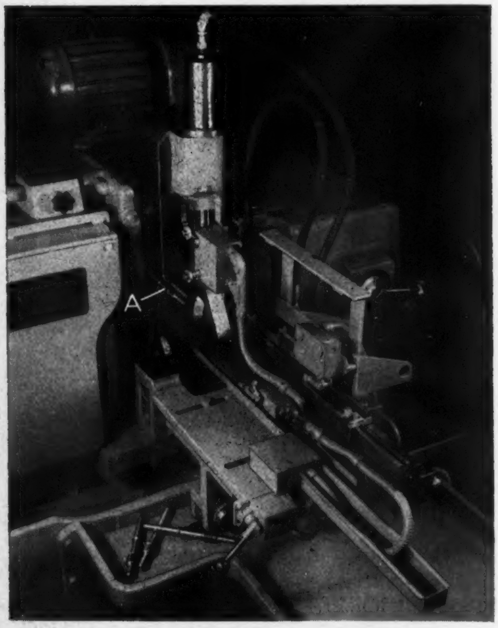


Fig. 1. Mounted on a Scrivener No. 3 centreless grinding machine, this transfer attachment enables workpieces to be manually loaded and unloaded at one side of the grinding zone

In operation, the workpiece is loaded, with the axis parallel to those of the wheel-head spindles, on a cradle at the lower end of a vertical carrier bar, as shown at *A* in Fig. 1. A shield ensures that the part is admitted only when it is correctly orientated, and it is lightly clamped by a gravity-loaded plunger housed vertically in the carrier bar. The width of this bar is such that the work projects at either side, the portions to be ground being entirely clear.

During the automatic cycle, which is initiated by means of a push button, the carrier is traversed towards the grinding zone, by horizontal movement of the cranked arm on which it is mounted, until the workpiece occupies a position directly above the work-plate, with the areas to be ground aligned with the wheels. A hydraulic cylinder is then brought into operation, to lower the carrier until the workpiece is supported on the plate. Grinding is performed automatically, in a cycle time of 17 sec., and after completion of the operation and retraction of the control head, the carrier is raised and then traversed away from the working zone. The finished part is thus returned to the original position, in readiness for unloading.

EXPORTS OF MACHINERY, other than electric, to Brazil totalled £7,377,379 in the 11 months ending November 30, 1960. For the same period of 1959, the total was £3,225,389.

NEW PRODUCTION EQUIPMENT

Edited by
G. W. Mason
and
A. J. Barker

Webster & Bennett Type EH Vertical Turning and Boring Mill

The range of vertical turning and boring mills built by Webster & Bennett, Ltd., Northey Road Works, Foleshill, Coventry, which is marketed in the U.K. by Wickman, Ltd., Factored Machine Tool Division, Fletchamstead Highway, Coventry, has been extended recently by the introduction of a type which has vertical adjustment for the cross-rail. Designated EH, this machine is available in sizes which have 4-jaw, independent chucks of 36, 48 and 72 in. diameter. Work up to 46, 58 and 84 in. diameter can be swung, and the maximum distance obtainable between the chuck surface and the underside of the cross-rail is 40 in. on the smallest machine and 48 in. on the larger sizes. In Fig. 1 is shown the largest of the new machines, and Fig. 2 is a close-up view of the machine set-up for taking a facing cut on a chemical vessel.

The heavily-ribbed bed and column are cast integral, to ensure the necessary rigidity for taking heavy cuts, and the chuck is mounted on a hollow spindle, which facilitates chip removal and permits the use of a boring bar. Drive is taken through V-belts and a multi-plate clutch, and 12 speeds for the chuck can be selected by means of direct-reading dials, changes being made hydraulically. There is a choice of five ranges, the lowest of which is from 1·9 to 41·5 r.p.m., and the highest, from 4·5 to 100 r.p.m. Final drive to the chuck is transmitted through a pinion and a large gear ring.

All the slides have long guiding surfaces, and taper gibs are provided. Drive for vertical adjustment of the cross-rail on the column ways is taken from a separate motor. On the machine in Fig. 1, the turret saddle may be traversed outwards, from a position co-incident with the chuck centre, for a maximum distance of 51½ in., and the vertical travel of the turret slide, which may be swivelled to either side of the vertical position, is 38 in. The turret saddle may be set to permit turning operations to be carried out at diameters up to the maximum which can be swung. Boring can be performed to a depth corresponding to the total travel of the turret slide only when the diameter thus machined exceeds 35 in. and, for smaller bores, the maximum depth is 28 in.

There are 12 feed rates for the turret saddle and slide, which are selected and changed in the same manner as described in connection with the chuck. A separate motor provides for rapid traverse of these slides. The forged steel turret is located, after indexing, by a quick-acting, positive arrangement, and a powerful clamping mechanism is incorporated. It is normally of the hand-operated type, but a power-operated turret, as described in MACHINERY, 96/1457—22/6/60, can be fitted if required.

Controls for the selection of speeds and feeds, and the operation of the various motors, are grouped together at the right-hand side of the machine, and the electrical equipment is housed in a compartment at the rear. Floor space of 12 ft. 8 in. by 10 ft. is required, and the weight, exclud-

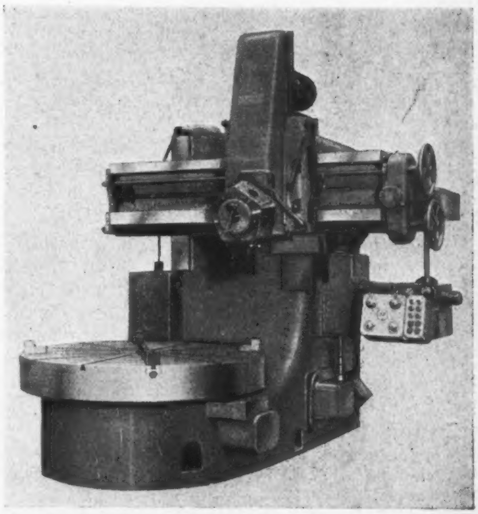


Fig. 1. Power vertical adjustment is provided for the cross-rail of this Webster & Bennett type EH vertical turning and boring mill

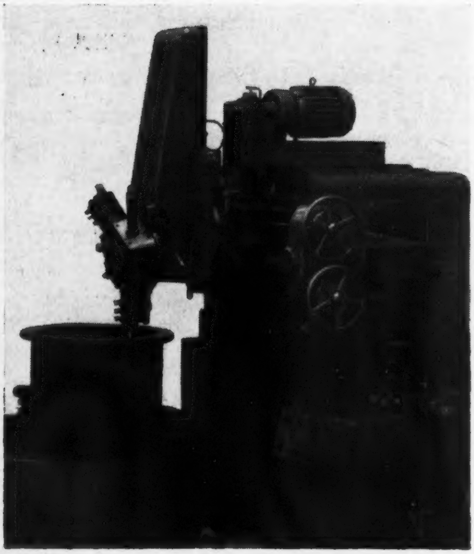


Fig. 2. Close-up view of the Webster & Bennett turning and boring mill set up for machining a chemical vessel

ing the electrical equipment, is approximately 13½ tons.

All the attachments designed for use with the company's fixed cross-rail boring mills can be employed with the new machine, and it can be supplied with built-in electronic profiling equipment.

D-Burr Gear De-burring and Chamfering Machine

Built by Burrows & Smith, Ltd., Leicester, the D-Burr machine shown in Fig. 1 is primarily intended for de-burring and chamfering the teeth on a wide variety of gears up to 12 in. diameter, although these operations may also be performed on other components such as ratchet wheels and sprockets. Sole agents for the machine in the United Kingdom are Alfred Herbert, Ltd., Factored Division, Red Lane Works, Coventry.

In operation, a gear is mounted on the spindle of the work-head, which is then swung upwards about a horizontal pivot, by means of a lever, to an intermediate position, as shown in the close-up view Fig. 2, with a number of the teeth engaged between helical ribs on the periphery of the grinding wheel. This position is adjustable and is determined by means of a heavily spring-loaded ball. Next, the grinding head motor is started, and the work-head is swung upwards, against the spring pressure, to bring the work to a second position against a dead stop. While the operation is in progress, the ribs serve to rotate the work, and during one complete revolution, chamfers are ground on the edges of the full profiles of the teeth, on one side of the gear. After grinding has been completed, the motor is switched off and a magnetic brake is automatically applied to stop the wheel spindle, and the work-head is returned to the original position. The gear is then inverted, and the cycle repeated for de-burring the teeth on the opposite side. As an example of the output obtainable, it is stated that when chamfering both faces of a 30-tooth 8 d.p. gear, the floor-to-floor time is 15 sec.

For de-burring helical gears, the head may be swivelled through a maximum angle of 30 deg. in either direction, and an attachment is available that enables bevel gears to be handled. Provision is made for transverse adjustment to enable the

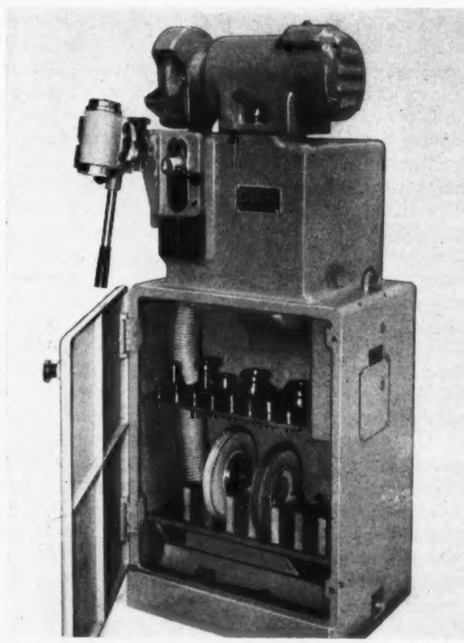


Fig. 1. This Burrows & Smith D-Burr machine can be employed for de-burring and chamfering the teeth on a wide variety of gears up to a maximum diameter of 12 in.

Fig. 2. Close-up view of the work-head on the Burrows & Smith D-Burr machine

full face width of the wheel to be utilized, also for vertical adjustment.

Developed as the result of co-operation with Norton Grinding Wheel Co., Ltd., the 8-in. diameter by 1¼-in. wide grinding wheel employed is supplied ready-formed to suit teeth of a particular size and profile shape. The structure is such that re-forming after wear has taken place is not practicable, but it is stated that very long life is obtained before it is necessary to discard the wheel. Drive to the wheel spindle is taken from a ½-h.p. rotor/stator unit. The entire grinding head may be adjusted towards or away from the work.

Dust extraction equipment is housed in the rear of the machine and it may be noted that the separate motor for this equipment and the grinding head motor are controlled by the same switch. The arrangement is such that the extraction equipment is brought into use before the grinding motor is started.

Lasco Type FP 221 S Electro-hydraulic Press

The latest type FP 221 S electro-hydraulic press from the Lasco range built by Langenstein & Schemann, A.G., Coburg, Bey., Germany, is shown in the illustration. Equipped with an 80-ton capacity drawing cushion, this 220-ton press may be employed for blanking and drawing operations, and, if required, the ram, which weighs 4 tons, can be allowed to fall freely to give a blow of 14,466 ft.-lb. maximum energy, for coining and stamping work. This feature enables planishing to be carried out following drawing, at the same setting, so that flanges and other portions of the work can be accurately flattened.

The ram has a maximum travel of 31½ in., and the drawing cushion, a working stroke of 17¾ in., a maximum daylight of 55 in. being obtainable. When the working stroke has been completed, the ram is returned to the top of its travel under a force of 22 tons, and a force of 12 tons is applied upwards by the drawing cushion, for ejecting the work. The maximum force to be applied by the ram and the drawing cushion can be pre-set independently by levers on the separate, floor-mounted hydraulic unit, and the working speed and the direction of travel can be controlled, during the operating cycle, by other levers built into the right-hand side member of the frame. Alternatively, movements of the ram and drawing cushion can be controlled electrically by push-buttons, mounted on another free-standing unit. If required, moreover, the press can be pre-set for an automatic cycle comprising from 1 to 5 ram strokes.

The steplessly-variable ram speeds available range from 69 to 72 ft. per min. for rapid approach, and from 7 to 8½ ft. per min. for the working portion of the stroke. Pressure oil for operating the ram, the drawing cushion, and the control system is delivered by separate pumps, driven by motors of 44, 13½, and 5½ h.p. The top face of the bed measures 39⅜ by 63 in., and the end surface of the ram, 39⅜ by 55 in.

Presses of similar design are available in capaci-

Lasco type FP 221 S electro-hydraulic press

ties from 75 up to 500 tons, which provide maximum blow energies for coining and stamping ranging from 2,880 to 20,160 ft.-lb.

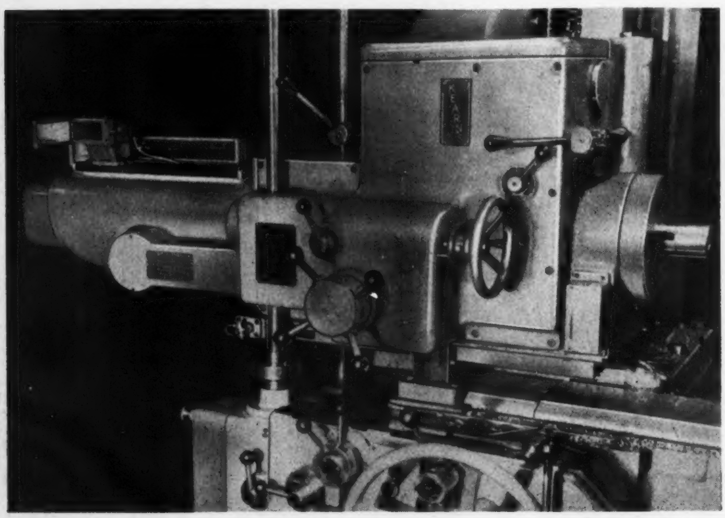
Paul Granby & Co., Ltd., 39 Victoria Street, London, S.W.1, are the distributors in this country for Lasco presses.

Optical Measuring Equipment for Kearns Horizontal Boring Machines

Optical equipment can now be supplied by H. W. Kearns, Ltd., Broadheath, near Manchester, for measuring axial travel of the spindles of their series 45 and 72 horizontal boring machines and the No. 2 and 3 patent horizontal boring machines. With a projection screen measuring 4 by 1½ in., the equipment permits movement at a normal feed rate to be read to 0·01 in., and final settings can be made by hand to 0·001 in.

A scale is carried on the upper surface of the housing for the spindle feed mechanism, as shown in the accompanying illustration, and is not subject to wear. An optical unit, which incorporates the projection screen, is secured to and moves with the rear spindle bearing. Graduations on the fixed scale are projected on to the screen, on which vernier markings are provided, and as the vernier and the projected image are on the same face, parallax errors are avoided. A mirror permits readings to be made from the normal operating position. With the rear bearing unit clamped in one position, spindle movement for a maximum distance of 12 in. can be obtained. If an additional length of traverse is required, however, the bearing can be re-clamped in a different position.

Fine adjustment is provided for the scale, which can thus be set to zero or a whole number division in relation to the optical unit. A pneumatic time switch is incorporated to protect the lamp of the optical system.



Optical equipment, as here shown, is now available for measuring axial movements of spindles on certain Kearns horizontal boring machines

Curvit Bending Machines

Funditor, Ltd., 3 Woodbridge Street, London, E.C.1, are now marketing in this country the bending machines built by the Curvit Division of the Maclodyne Corporation, East Providence, R.I., U.S.A. An example is shown in the accompanying illustration from a range of horizontal-type machines, which are intended for forming coils or rings from tubes and a wide variety of other cross-sectional shapes. The range includes the No. C 145 machine, as seen in the figure, with which tube up to 1 in. diameter or steel bars of ⅜ by ¾ in. can be coiled or formed edgewise to radii which are steplessly variable. The smallest machine, known as the type C 1, will handle tube from ⅛ to ⅜ in. diameter, and the largest (type C 170) has a capacity for 3-in. diameter tube. Special machines can be supplied for bending tube up to 5 in. diameter.

Bending is performed by a large diameter roll, which is mounted at the upper end of a vertical shaft at the centre of the circular head, and two smaller rolls. The small roll past which the material enters is mounted on a carrier that may be bolted in various angular positions in relation to the large roll. The bending roll is carried on an arm, which may be swivelled about the axis of the large roll and a small crank handle provides for adjusting the angular position, for setting the bending radius. At the beginning of a bending operation, this arm is swivelled by an air or hydraulic cylinder, thereby thrusting the roll into the pre-deter-

Curvit type C 145 universal bending machine for tube and strip material

mined position and initially forming the workpiece. The arm is held in position during the progress of bending, and a maximum thrust of 12,000 lb. in. can be applied on the largest machine mentioned with air at a pressure of 80 lb. per sq. in.

With this arrangement, the machine may be operated by means of push-buttons, to enable bending to start from the leading end of a workpiece, or after a straight portion has been passed through the rolls. Moreover, bending may be interrupted during the passage of the work, for example, when producing parts with intermediate straight portions, or to alter the bending radius. Equipment can be supplied to enable tubes to be formed to rectangular, octagonal, and other shapes in an automatic cycle.

When forming coils, bending in a second plane is obtained by means of a pitching device which permits stepless variation. An air-hydraulic attachment available for the largest machine enables rings or the turns of coils which are made from strip material, and have a minimum diameter of 1½ in. and maximum wall thickness and height of ⅜ and 6 in. respectively, to be flanged at angles up to 90 deg. or radiused at either end. The material may also be inclined to a maximum angle of 60 deg., with reference to a plane at right-angles to the axis of the completed part, for forming rings or turns of conical shape. Bending and flanging may be carried out at the same setting.

Drive for the largest machine is taken from a 20-h.p. motor, and is transmitted by means of reduction gearing to the large roll. Spur gear teeth machined on the periphery of this roll, below the profiled portion, engage similar teeth on the small rolls, to drive the latter members.

Known as down coilers, alternative versions of the machines are available, with the axis of the bending head horizontal. With this arrangement, coiled work may be supported, after leaving the tools, on a cylindrical bar, and the completed part may be removed without stopping the machine.

Thiel Type 117 Bandsawing and Filing Machine

Shown in the illustration is the new type 117 bandsawing and filing machine introduced by the German firm of Thiel, who are represented in this country by Rockwell Machine Tool Co., Ltd., Welsh Harp, Edgware Road, London, N.W.2.

This machine has a throat depth of 19⅝ in., and will handle work up to 9¾ in. thick. The bandsaw blade passes round three guide wheels mounted on ball bearings, and is driven by a variable speed unit from a 1½-h.p. motor, which is controlled by a pedal-operated switch. The steplessly-variable saw speeds obtainable range from 50 to 3,000 ft. per min., and are selected by means of a handwheel in conjunction with a dial-type indicator mounted on the side of the base. A butt welding and annealing unit for joining saw blades, also grinding and guillotine attachments, are housed behind a door on the upper part of the frame, which encloses part of the blade and two guide wheels. The upper guide wheel can be adjusted vertically for varying the tension on the saw blade.

The 24- by 24-in. work-table can be swivelled through angles up to 30 deg. to the right and left, and can be tilted through a maximum of 15 deg. on each side of the horizontal position, by means of racks and pinions, scales

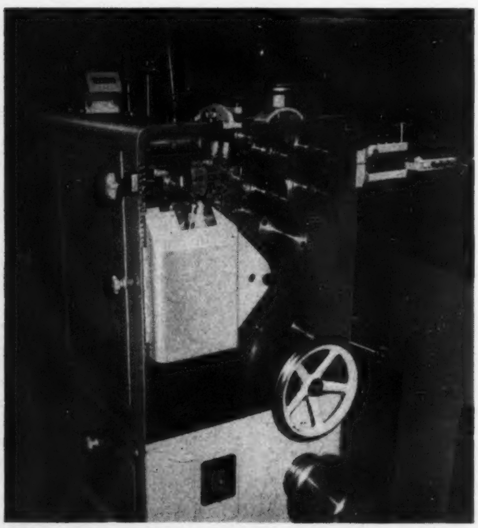
Thiel type 117 bandsawing and filing machine

being provided to facilitate setting. A low-voltage lamp, a magnifying lens, and an air pump and nozzle for blowing cuttings clear of the working area, are provided.

M.R.P. Type W-11 A Automatic Universal Spring-coiling Machine

The type W-11 A, German-built Meyer, Roth & Pastor-Torrington automatic universal spring-coiling machine shown in the accompanying figure will produce a wide variety of coiled springs of the compression or tension types, with or without closed ends, and with right- or left-hand windings, also, with the aid of various accessories, cylindrical double or single taper springs, other types of specially formed springs, and plain rings. By means of a special attachment, torsion springs with open or closed pitch windings, and with or without straight tails, can also be made, in a wide variety of shapes.

The machine is fully automatic in operation and wire is drawn, from a coil, through the straightening attachment seen at the extreme right. As each spring is completed, it is automatically cut off and ejected and the cycle is repeated continuously. A steplessly-variable drive unit is incorporated, which enables the optimum working conditions for any required gauge of wire, and shape of spring, within the capacity of the machine, to be readily obtained.



M.R.P.-Torrington type W-11 A automatic universal spring-coiling machine

Wire size may range from 27 to 15 gauge, and the maximum length of wire normally permissible for any one spring is approximately 41¾ in. Springs ranging from $\frac{3}{32}$ to $1\frac{9}{16}$ in. outside diameter can be wound, and the output ranges from 22 to 180 per min., depending upon the size and complexity. Extra change gears are provided for springs with wire lengths up to a maximum of 7½, 12, and 24 in., also for wire lengths in excess of 41¾ in. and up to a maximum of 83 in., in certain gauge sizes.

M.R.P. spring-coiling machines are marketed in this country by Soag Machine Tools, Ltd., 7 Juxon Street, London, S.E.11.

Mattison Travelling Head Grinding Machine for Facing Large Coil Springs

For facing the ends of large coil springs, Mattison Machine Works, Rockford, Ill., U.S.A., have recently built a modified version of their type 500 UK travelling head grinding machine, which is shown in the accompanying figure. There are two working stations, which are arranged side-by-side. The grinding head is mounted on longitudinal ways on a bed member at the rear, and the wheel is rotated in a vertical plane parallel with the direction of traverse. In the figure, the head is obscured by the guards.

Unloading and loading, and turning the work end-for-end, are carried out alternately at the two stations, while grinding is in progress at the other position. After a workpiece has been located against the fixed stop at one station, it is clamped by an air-powered arrangement, which is brought into operation by push-button. A second push-button is then pressed to initiate the automatic grinding cycle. During this cycle, the head is hydraulically reciprocated to pass the wheel across the end of the work, and is finally traversed along the ways to a position opposite the other station, in readiness for the next sequence of operations. With this machine, it is claimed, improved accuracy has been obtained, and it has enabled production rates for springs of two particular sizes to be increased from 10 to 20 and 3 to 7¾ per hour.

The Mattison type UK grinder is normally supplied with a single T-slotted table, which may have a length of 86 in. or more. Machines of three sizes are available, which are designated series 500, 600 and 700 and will accommodate work with maximum heights of 22, 30 and 40 in., respectively. The grinding head carriage on a machine of the smallest size is mounted on V- and flat ways on the bed. Traversing speeds from 12 to 30 ft. per min. are obtainable, and drive is taken from a 4-speed, reversing, 5-h.p. motor.

This modified version of the Mattison 500 UK travelling head grinding machine, for facing the ends of large coil springs, has two working stations

A segmental grinding wheel of between 30 and 36 in. diameter is employed, and the large-diameter wheel spindle runs in precision-type Timken taper roller bearings. Drive is taken from a 40-h.p. motor, which is mounted above the head, and is transmitted to the spindle through multiple V-belts. Cross-movements of the grinding head can be made by hand or power, drive for the latter motion being taken from a ¾-h.p. motor. In addition, feed increments can be applied either automatically or under hand control, by means of a separate, ¼-h.p. motor.

Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London, S.W.11, are the agents in this country for Mattison Machine Works.

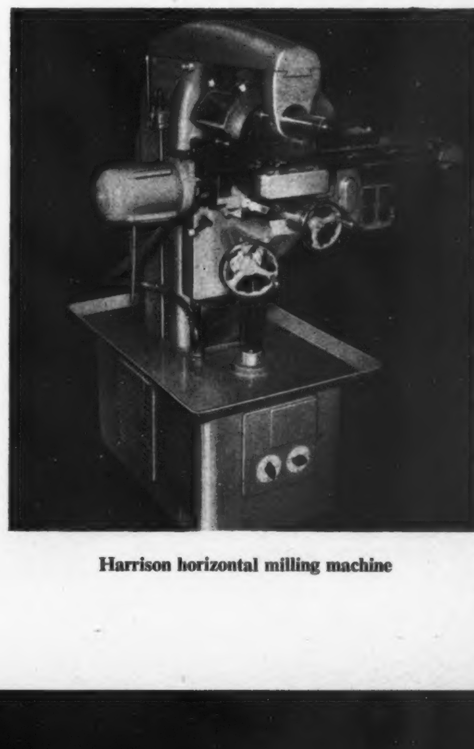
Harrison Horizontal Milling Machine

In the figure is shown the latest addition to the range of milling machines built by T. S. Harrison & Son, Ltd., Union Machine Tool Works, Heckmondwike, Yorks. This machine is arranged for automatic cycle operation, and fast traverse for the table, at the rate of 280 in. per min., is provided by means of the flange-mounted brake-type motor seen at the left. Alternatively, the machine can be supplied without facilities for automatic cycle operation. Longitudinal movement of the table is then provided by a separate power drive, and there are facilities for hand setting.

The work-table has a surface of 30 by 8 in. and is T-slotted and ground. Longitudinal and transverse movements of 15 and 6½ in. are obtainable, and the vertical traverse of the knee is 11 in. Transverse and vertical movements are hand operated, but for the longitudinal motion there are eight power feeds, ranging from 0·89 to 12·6 in. per min.

The spindle has a No. 30 international standard nose and there is a choice of eight speeds in two ranges, namely 45 to 1,000 and 67 to 1,500 r.p.m. Drive is taken from a 2-h.p. motor and is normally controlled by direct-on push-buttons. If required, a multi-disc friction clutch and brake can be incorporated in the drive as additional equipment.

Of cast iron, the column and over-arm are



Harrison horizontal milling machine

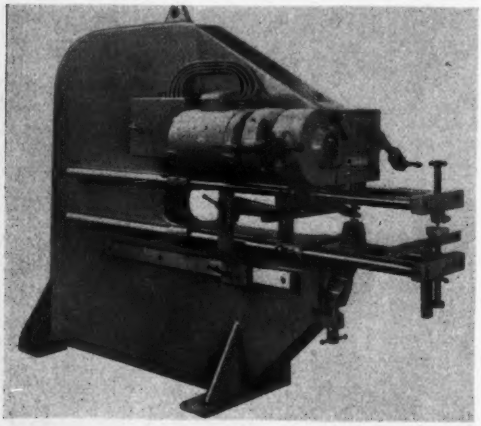
secured to a weld-fabricated steel base, and the latter houses the main driving motor, also coolant equipment, if required. A vertical milling attachment is available for use with this machine, and incorporates gearing to provide spindle speeds from 84 to 1,860 or 125 to 2,800 r.p.m., depending on the speed range of the horizontal spindle. This attachment also has a No. 30 standard nose, and is arranged to swivel through 45 deg. on either side of the central position.

Pioneer Type NA 1200/9 Universal Shearing and Nibbling Machine

The firm of Bachofen & Meier, Bulach, Switzerland, have recently added the type NA 1200/9, here illustrated, to their Pioneer range of universal shearing and nibbling machines. Reference to the smaller type NA 1000 machine was made in MACHINERY, 94/900—22/4/59.

This new size has a capacity for nibbling and shearing mild-steel sheet up to ⅜ in. thick, and for forming, peening, louvring, flanging, and folding sheet up to 3/32 in. thick. Drive is taken from a 3-speed motor of 5½/6/8 h.p. which gives speeds of 700/900/1400 r.p.m., and the stroke is steplessly variable from zero to ⅜ in. The machine body is of welded steel construction and the nibbling head is a malleable casting. All rotating parts run in ball bearings.

A circle cutting attachment, supplied with the machine as standard equipment, has a capacity from 9½ in. to 110 in. There is also a straight guide cutting attachment which is adjustable vertically and horizontally. The machine will shortly be available with a co-ordinate table.

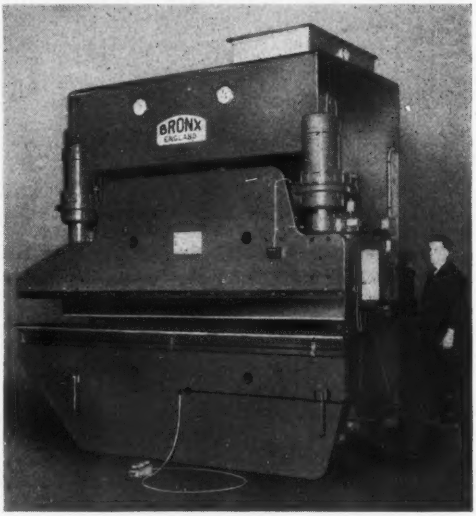


Pioneer type NA 1200/9 universal shearing and nibbling machine

The sole agents in this country for Pioneer universal shearing and nibbling machines are the Press & Shear Machinery Co., Ltd., 172-178 Victoria Road, Acton, London, W.3.

Bronx Hydraulic Press Brakes

The range of hydraulic press brakes made by the Bronx Engineering Co., Ltd., Lye, near Stourbridge, covers sizes from 120 to 750 tons. In the accompanying illustration is shown a 120-ton machine which has a capacity of 8 ft. between columns, and 12 ft. overall, a 2-ft. horn extension being provided at the left-hand end of the bed and slide.



Bronx 120-ton hydraulic press brake

It is stated that the hydraulic system enables "air bends" to be made with the same accuracy as is obtainable with a mechanical press. The machine cannot be overloaded, and the rated tonnage is available throughout the whole length of the stroke.

Provision is made for inching down the slide, and reversing it at any point in the stroke. Selector switches enable the machine to be set for continuous or single-stroke operation, with timed dwell, or indefinite dwell at the bottom of the stroke and automatic reversal when a pre-set tonnage is reached.

Developments in Explosive Forming*

By W. S. HOLLIS, Ph.D., B.Sc., A.F.R.Ae.S., M.I.Prod.E.†

WITH EXPLOSIVE FORMING, energy resulting from detonation of the charge is transmitted in the form of impulse waves through a suitable medium, usually air or water, with the result that deformation of the workpiece metal takes place under high hydrostatic forces. Since the resulting strain rates considerably exceed those obtainable by mechanical means, spring-back of the metal is virtually eliminated. Another effect of the rapid application of the hydrostatic forces is that strain hardening is reduced, and the yield strength of the metal is improved without the introduction of localized, unbalanced, stresses. Deformation of the work is usually completed within 100 milliseconds, of which the elastic phase occupies about 25 milliseconds.

In addition to forming operations on sheet metal parts, explosives may be employed for swaging and for compacting metal powders. For explosive forming, single-piece dies are often employed, which, when small batches of parts are to be produced, may be of simple design, and backed up by large masses of shock-sustaining material such as Kirksite or Kayem alloy. Epoxy resins have good

* Abstract of a paper presented at the recent conference on "Modern Trends in the Manipulation of Metals" arranged by the Institution of Production Engineers.

† Assistant Director, Aircraft Production Development, Ministry of Aviation.

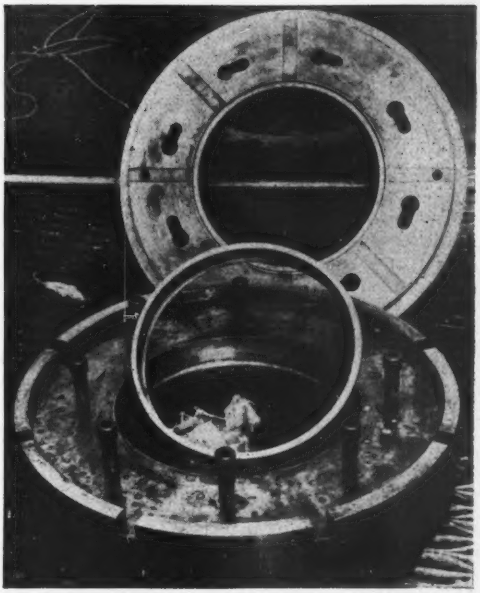


Fig. 2. The flanged conical ring shown resting on the lower half of the mild steel die has a wall thickness of 18 s.w.g., and was explosive formed from a welded blank

Fig. 1. For producing a panel from a shaped blank prepared from 22 s.w.g. sheet of Nimonic 75, the explosive charge was immersed in water, contained in a polythene bag, which was suspended above a die made from Kirksite. With this arrangement, puckers were formed at one end of the completed workpiece, which, it is considered, could have been avoided by the use of a pre-formed blank, and a different arrangement of the explosive charge

recovery properties, and for this reason, these materials may be used for making dies for certain explosive forming operations. A die for explosive forming a fairly large cylindrical or conical component usually takes the form of a cast matrix of Kirksite or epoxy resin, supported by a ring with a wall thickness of about 8in., which is cast in nodular iron.

In certain instances, pre-forming of the workpiece blank by drawing or other means may be necessary, to reduce the risk of bursting portions which are not supported by the die, when the actual explosive forming operation is being carried out. Blanks for tubular components should be prepared by rolling and seam welding, and should be of such dimensions as to permit explosive forming to the required size and shape without exceeding the permissible strain values. Blanks of heat treatable steel should be fully annealed, and, following explosive forming, hardening, precipitation treatment, and a sizing operation to remove any irregularities in the workpiece shape, may be carried out.

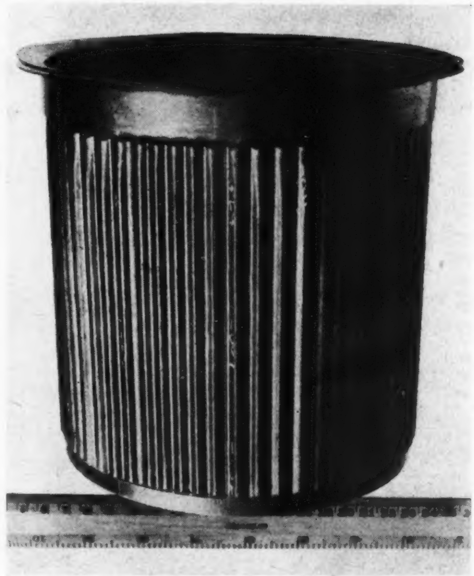


Fig. 5. Explosive forming of this component was carried out in a vacuum, at a single operation, with an 8-ft. length of Cordtex weighing 1·023 oz.

Some work in the field of explosive forming has been undertaken by a number of firms and organizations, including Rolls Royce, Ltd., D. Napier & Son, Ltd., Lucas (Burnley), Imperial Chemical Industries, Ltd., De Havilland, and the Production Engineering Research Association. The College of Aeronautics have undertaken investigations into the parameters introduced by the shape and size of the explosive charge, stand-off distance, and effective hydrostatic head above and below the charge, for explosive forming light alloy, stainless steel, and titanium. In addition, spring-back

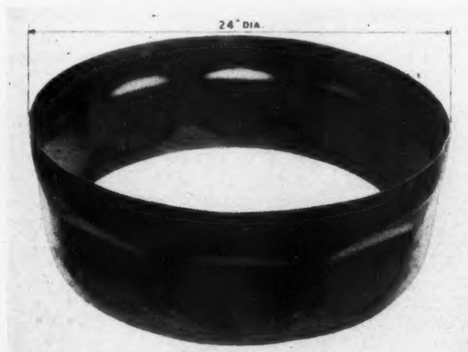


Fig. 3. (left) Bearing housing component, made from 14 s.w.g. thick Fortiweld material, is 31 in. diameter at the neck, and was produced by explosive forming in three operations. For the first operation a 12 ft. long Cordtex explosive charge was used, which weighed 38·1 grammes (1·34 oz.). Cordtex charges 20 ft. long, which weighed 63·5 grammes (2·4 oz.), were employed for the second and third forming operations

Fig. 4. (right) Bearing housing component, of 24 in. diameter, which was formed at two operations. A 12-ft. long Cordtex charge, weighing 1·34 oz., was employed for the first forming stage, and an 8-ft. length (1·023 oz.) for the second operation

of the workpiece metal, and bend radii, have been investigated. Apart from providing information on construction of equipment and safety precautions, A.R.D.E., Fort Halstead, have been concerned with the forming of hemi-spherical and tubular shapes with the object of studying certain variables, and have approached the subject as a fundamental study in physical metallurgy. It is expected that explosive forming will be established as an industrial process at one of the Royal Ordnance Factories.

Work has so far been carried out with charges of Cordtex (Imperial Chemical Industries, Ltd.) explosive, with weights ranging from 10 to 70 grammes (0·35 to 2·46 oz.), for forming various components for aircraft from different sheet metals. Cordtex is somewhat similar in appearance to domestic electric cable, and is available in lengths of 500 ft., each of which provides an explosive charge weighing 3½ lb. Although Cordtex is chemically stable, certain safety precautions should be observed when it is being handled. It can be cut to the required length and is fired by a detonator, connected by electric cable to an exploder, which usually takes the form of a generator of the hand winding type. It may be mentioned that investigations are proceeding at A.R.D.E., in connection with the explosive forming of workpieces with charges which weigh as much as 4 lb. Some set-ups for explosive forming, and examples of workpieces that have been produced by this process, are shown in Fig. 1-5.

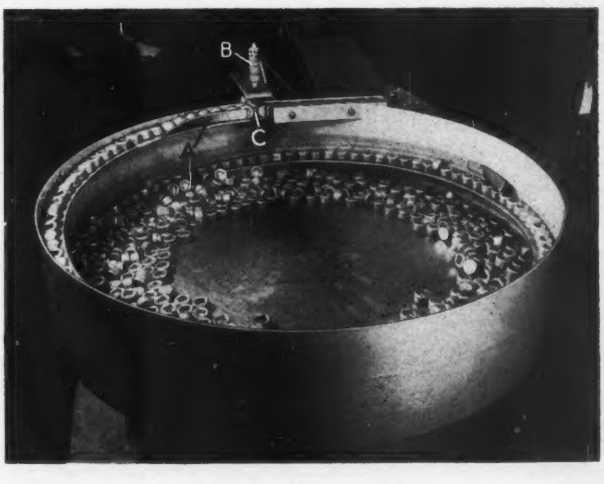
Hopper Feed for Taper Pipe Plug Blanks

In the accompanying figure is shown a vibratory-type spiral track hopper which is employed for feeding taper pipe plug blanks to a Landis Lanhyrol thread-rolling machine (Landis Machine Maiden, Ltd.). The blanks, which have square sockets, are tapered externally, and must be fed to the threading rolls correctly orientated. It will be noted that the blanks are loaded at random into the hopper, and proceed along the spiral track in a clock-wise direction towards the deflector plate *A*.

This plate serves to turn the blanks through 90 deg., so that they proceed on their sides, but it will be appreciated that they are still arranged at random as regards the external taper. Between the end of the deflector plate *A* and the entry end of the delivery chute from the hopper there is a gap, and immediately above this gap is mounted a proximity-sensing device *B*. This device is located transversely so that it is in line with one end of each blank, and depending on the orientation of the latter, the periphery will be close to, or removed from, the sensing probe, as a result of the taper.

For correct orientation, the blanks must enter the delivery chute with the socket portions away from the camera. It will be noted that the blank at the right-hand end of the deflector plate *A* is incorrectly orientated, and when it advances to a position beneath the probe the latter will operate to close an electrical circuit. As a result, a pneumatic cylinder is energized to advance a small plunger, the leading end of which is indicated at *C*, and the incorrectly-orientated blank is thrust sideways from the track and falls into the hopper.

On the Lanhyrol machine which is fed by the hopper, one blank is threaded for each revolution of the rolls, and the production rate for ½- and ¾-in. pipe plugs is stated to be 132 per min., and for 1-in. plugs, 100 per min. The Lanhyrol machine was described in MACHINERY, 97/615—14/9/60.



This spiral-track vibratory-type hopper is used to deliver tapered blanks for pipe plugs to a Landis Lanhyrol thread-rolling machine. It incorporates a proximity-sensing device which rejects blanks that are incorrectly orientated

Hayes Tracemaster 3-spindle Copy Milling Machine for Cylinder Heads

The Tracemaster 3-spindle machine shown in Fig. 1 has recently been supplied by Hayes (Engineers), Ltd., Gelderd Road, Leeds, 12, to the Standard Motor Co., Ltd., Coventry, for copy milling compression cavities in heads for 6-cylinder engines. It has been developed from the Tracemaster type TM. 43-3D machine which was described in MACHINERY, 94/41—7/1/59, and is equipped with a special cutter head.

The profile shape of the compression cavity is controlled by a template, surmounted by a guide plate. This template is secured to the left-hand end of the work-holding fixture, which is mounted on the table, as may be seen in the close-up view Fig. 2. When a cylinder head has been loaded into the fixture, a push-button is pressed to start the working cycle. The table knee is then raised hydraulically, with the result that the work is fed upwards in relation to the cutters to bring it into

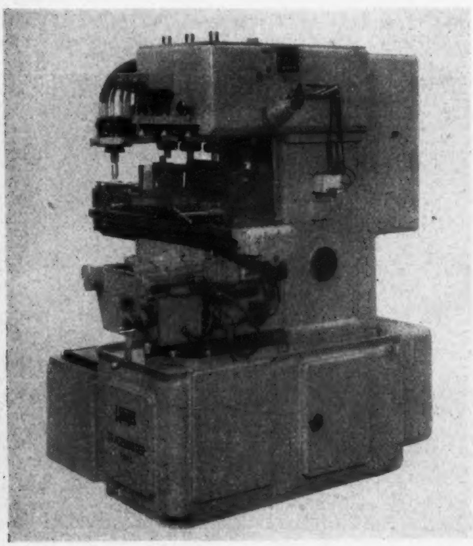


Fig. 1. This Hayes Tracemaster type TM. 43-3D machine is equipped with a 3-spindle cutter head and was supplied for copy milling compression cavities in cylinder heads

Fig. 2. Close-up view of the work and template on the machine shown in Fig. 1

position for milling the cavities to the full depth, and the template is brought to the working position. Next, the stylus pin of the Digitrace 360-deg. hydraulic tracer head is guided by hand round one of a pair of openings in the template, for copy milling three of the cavities in the cylinder head.

When these cavities have been completed, the knee is automatically lowered to bring the face of the cylinder head clear of the cutters. The stylus pin is now moved sideways, through the central opening in the guide plate, and the three remaining cavities in the cylinder head are thus brought into position beneath the cutters. When the knee is automatically raised to its original position, the pin is traversed round the second template opening to complete the operation.

Finally, another push-button is operated, with the result that the knee is lowered again to bring the top face of the work clear of the cutters, and the spindles are stopped in readiness for unloading the cylinder head. When the knee has been brought to the unloading position, the tapered end of the stylus pin is still within the opening in the guide plate. It is thus ensured that during the subsequent upward movement of the knee, the stylus is guided into a template opening.

Mattison-Anocut Electrolytic "Grinding" Machine

AT THE WORKS OF THE INGERSOLL MILLING MACHINE Co., Rockford, Illinois, U.S.A., tungsten-carbide tipped blades for milling cutters are being "ground" electrolytically, and it is reported that considerable economies are thus obtained. This operation is carried out, after the carbide tips have been brazed to the blades, on a No. 24 A vertical-spindle, rotary-table, surface grinder, built by the Mattison Machine Works, Rockford, which is provided with 1,500-amp. electrolytic "grinding" equipment, supplied by the Anocut Engineering Co., Chicago, as shown in the illustration.

The work table on this machine is driven at an exceptionally low speed, in the range from 1·7 to 12 rev. per hour, and from 0·005 to 0·008 in. of metal is removed from the top face of the carbide tip and the blade at a single pass beneath the 16-in. diameter diamond-impregnated grinding wheel, which has a face width of 4 in. Surface finish on the work is held within 20 micro-inches. Because about 90 per cent of the metal is removed from the work by electrolytic action, only a very small amount of wheel wear takes place, and it is stated that expenditure on grinding wheels has been reduced by 80 per cent. In addition, heating—and consequent cracking—of the carbide tips is avoided. With the grinding wheel employed, diamond particles of 100 grit extend for a depth of $\frac{1}{16}$ in. into the face. Drive to the spindle is taken from a 25-h.p. motor, which runs at a speed of 1,800 r.p.m.

Previously, grinding was carried out on a conventional horizontal-spindle machine, but since a considerable pressure was required to remove metal from the carbide tip, some gouging of the steel blade took place, which resulted in clogging of the grinding wheel. In consequence, there was a risk of spoiling the workpieces, due to heating and cracking of the tips.

Milling cutter blades are loaded on to—and subsequently removed from—the magnetic chuck on the table of the Mattison machine, by hand. Wedge-shaped magnetic pole pieces in the chuck are automatically energized individually when the blades have been brought close to the wheel, and are de-energized as soon as "grinding" has been completed. Electrolyte is blown outwards away from the brushes which carry current to the grinding wheel by compressed air delivered by a small blower unit, and there is a collecting system for returning the vapour, by way of a condenser, to the reservoir. A limit switch is operated to stop the table in the event of an oversize cutter blade being fed to the grinding wheel. When a pre-set load is applied to the Anocut unit, a brake is automatically applied to stop the table. If required, automatic work sizing equipment can be provided.

Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, London, S.W.11, are the agents in this country for Mattison Machine Works.

This Mattison vertical-spindle machine, provided with Anocut equipment, has been installed in the works of Ingersoll Milling Machine Co., for the electrolytic "grinding" of tungsten-carbide tipped blades for milling cutters

Cross Transfer Machine for Small Cylinder Blocks

A COMPLEX IN-LINE TRANSFER MACHINE has recently been supplied by the Cross Company, Detroit, Michigan, U.S.A., to a well-known motor car manufacturer in Europe for operations on 4-cylinder blocks for a small car, and a general view of part of this machine is shown in Fig. 1. It provides for milling, cylinder boring, drilling, reaming, tapping, machining cam- and crankshaft bores, assembly of bearing caps, and inter-stage and final inspection. A total of 123 holes of different sizes will be machined, and several faces milled, and the output will be approximately 85 blocks per hour. Cycle times for certain sections of the installation differ, and to ensure balanced flow, storage conveyors are provided at various points. The layout of the machine is such that it can be adapted to accommodate alterations to the design of the blocks, as required.

The machine is divided into six main sections, and the view in Fig. 1 shows the first four, with section No. 1 in the foreground. Blocks are delivered to the machine with the top and bottom surfaces already machined, by broaching, and in the first section a number of heavy metal-removal operations are performed. Before passing to the machining stations in this section, the blocks are automatically rolled through 270 deg., to ensure that any chips remaining from the broaching operation are discharged, and are then automatically positioned and clamped.

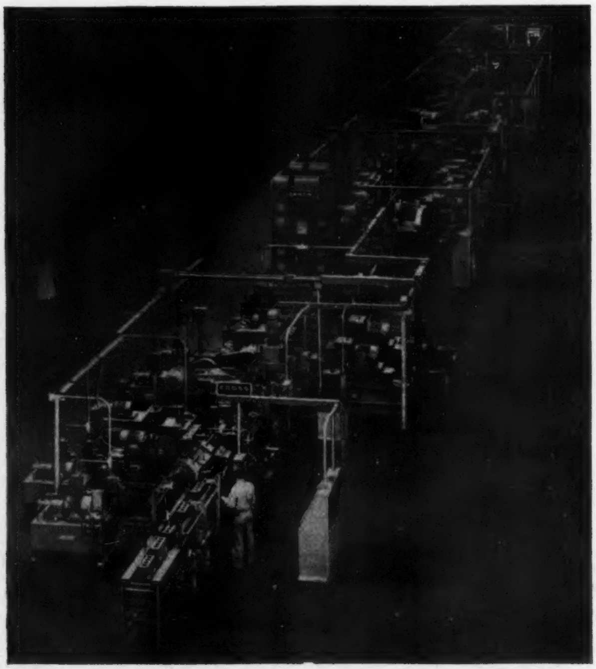


Fig. 1. General view of part of a large in-line Cross transfer machine which has been supplied to a well-known European motor car manufacturer for performing multiple operations on 4-cylinder blocks

Each block casting is checked by means of a battery of probes, which are automatically advanced to enter various portions, and some of these units can be seen in Fig. 2, where the outline of a block is shown superimposed in white. If any probe is unable to enter the block, on account of interference with a cast surface, a signal is transmitted by an air-operated device, and the faulty casting is removed.

In the first section of the machine, the operations performed include straddle-milling the crankshaft bearings, cutting anchor-lock notches and oil-slinger grooves, and drilling tappet holes. Between these operations, the block is again rolled, to discharge chips, and the next station provides for boring the cylinders. A view of this portion of the machine is shown in Fig. 3, and it will be noted that there are two vertically-mounted, twin-spindle boring heads. These heads are carried on massive cast-iron columns—each of which weighs 7 tons—bolted to the main bed of the machine. Alternate cylinder bores are machined by each head, and the blocks are indexed from one head to the other to complete the four bores.

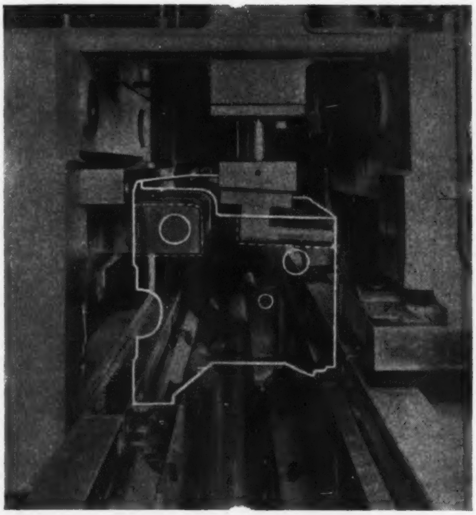


Fig. 2. In this close-up view can be seen the probe units which are advanced at the first station to check the block prior to clamping. The outline of the block is shown superimposed in white

It may be noted that the boring spindles are of the cartridge type and are provided with water-cooling, to ensure an even operating temperature. Attention may also be drawn to the fact that each column has a deep throat, to house the major portion of the boring head. With this arrangement, the vertical guides are located in the same plane as the spindle axes. As a result, bending forces imposed by the boring operation are reduced to a minimum, and accurate control of the path of the cutter is ensured. Throughout the first section of the machine, the blocks are indexed in 36-in. increments by a conventional axially-sliding bar arrangement, a part of which can be seen in the foreground of Fig. 2. This bar is provided with projecting ears, and is turned about its longitudinal axis, to engage and disengage the ears with the castings at the beginning and end of each transfer stroke.

On entering the second section of the machine, which provides for milling the end faces of the blocks, the latter are turned through 90 deg., and proceed with their longitudinal centre lines at right angles to the direction of transfer. In this section, the transfer increment is 24 in., and movement is imparted to the blocks by a walking-beam mechanism.

Motion for the latter is derived from the cylinders which provide for the feed of the milling heads, and the direction of feed is opposite to the direction of transfer. The arrangement is such that when the milling heads are returned to the starting positions the transfer movement takes place simultaneously, and since both these movements are in the same direction there is no relative motion between the work and the cutters. Consequently, the need to provide for cutter relief is avoided.

A view of the milling heads provided in the second section of the machine is given in Fig. 4, where cylinder blocks can also be seen. The pair of milling heads in the foreground is duplicated at the other side of the machine, and the right-hand head at each side provides for rough-machining and the left-hand head for finish-machining. At the completion of any one feed stroke of the heads, both ends of one block have been rough-milled, there are two rough milled blocks at idle stations between the two heads, and

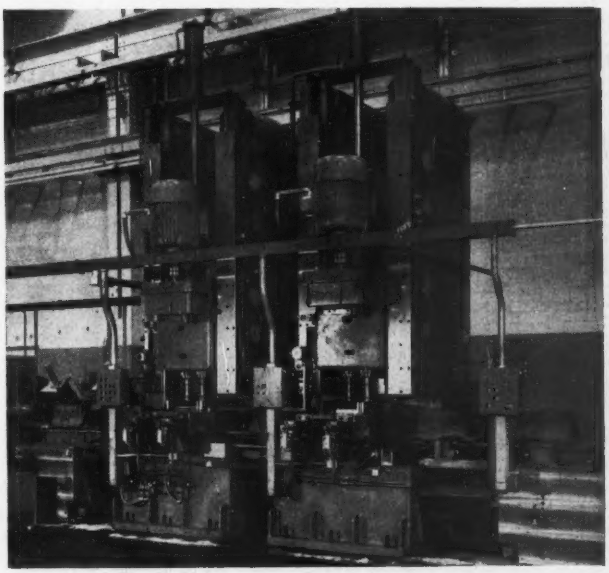


Fig. 3. General view of the cylinder-boring section. Two twin-spindle vertical heads machine alternate bores, the blocks being indexed between operations

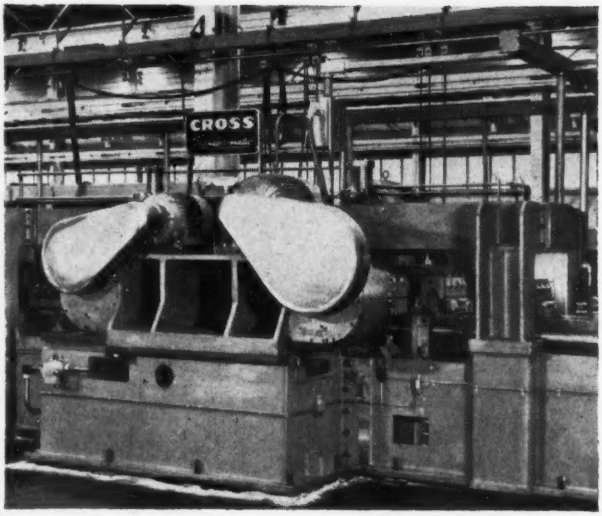


Fig. 4. In this general view of the milling section can be seen two of the heads which provide for rough and finish machining the end faces of the blocks. There is a corresponding pair of heads on the opposite side of the machine.

both ends of one block have been finish-milled. When the blocks leave this station all the heavy-metal-removing operations have been completed, and there is ample time during the subsequent light-machining operations for the temperature of the castings to become stabilized, in readiness for the finishing operations at the end of the sequence.

The second section of the machine also provides for deep-drilling oil gallery holes and for checking the porosity of the casting. Drilling is carried out, to progressively increasing depths, at six different stations, and at each station a Cross Protect-O-Tool unit monitors the operation and automatically shuts down the section if a drill should break. After it has been drilled, each gallery hole is plugged and air is introduced, under pressure, for a predetermined period. If there is a leakage of air during this period, the block is sprayed with yellow paint and removed from the machine, to ensure that no further operations are performed.

Blocks leaving the last station of section 2 are turned through 90 deg., in the horizontal plane, and are fed to a storage conveyor, whence they are later delivered to the third section of the machine. This section provides for a number of conventional light-duty milling and drilling operations, on both sides of the blocks, also for tapping, rough-reaming the tappet holes, and chamfering both ends of the cylinder bores. The blocks now enter section four, which serves only for semi-finish and finish reaming the tappet holes. There are eight idle stations between these two operations, and finish reaming is performed by heads which are effectively isolated from the main machining line. A filtered coolant system is provided, and serves this section of the machine only.

From section 4, the blocks are passed to a washing unit and thence to a storage conveyor, and are sub-

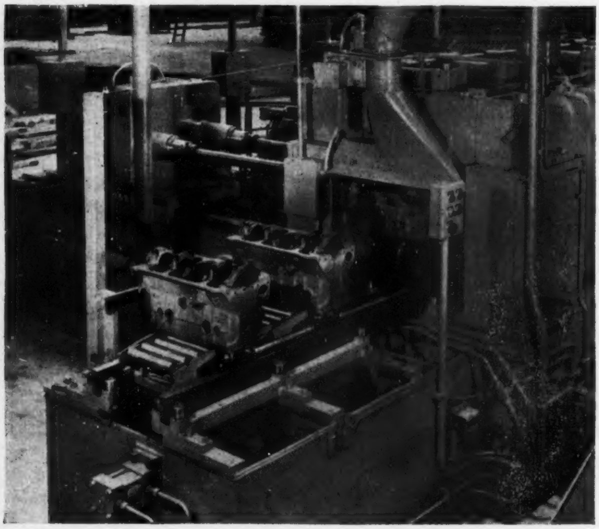


Fig. 5. The final section of the machine provides for rough and finish machining the cam- and crankshaft holes in two blocks at a time. In the left background can be seen one of the 4-spindle heads provided for these operations

sequently delivered to section 5, where the four crankshaft main bearing caps are assembled. An operator places the caps in position, also inserts two bolts in each, and the latter are then automatically tightened, to a pre-set torque, at the single working station provided in this section. The blocks are then diverted to another storage section, whence they are automatically delivered, two at a time, to the first station of section 6, the entry end of which is shown in the close-up view Fig. 5.

Here, both the camshaft and crankshaft bores are rough-machined in two blocks simultaneously, a typical 4-spindle head being seen in the left background. The free ends of the boring bars are guided in live bushes, carried in the column at the right, and intermediate support is also provided by bearings located within the cylinder blocks.

At the third station of this section, the thrust faces on the bearing caps are faced, and oil-slinger and seal grooves are machined. Finally, a further operation is performed on the cam- and crankshaft bores and the blocks are delivered to a cleaning section, which is equipped with special brushes and air-blast nozzles. Finished blocks are then delivered to a checking station, where all the bores are inspected automatically, with air-gauging equipment.

Large Triulzi Injection Moulding Machine

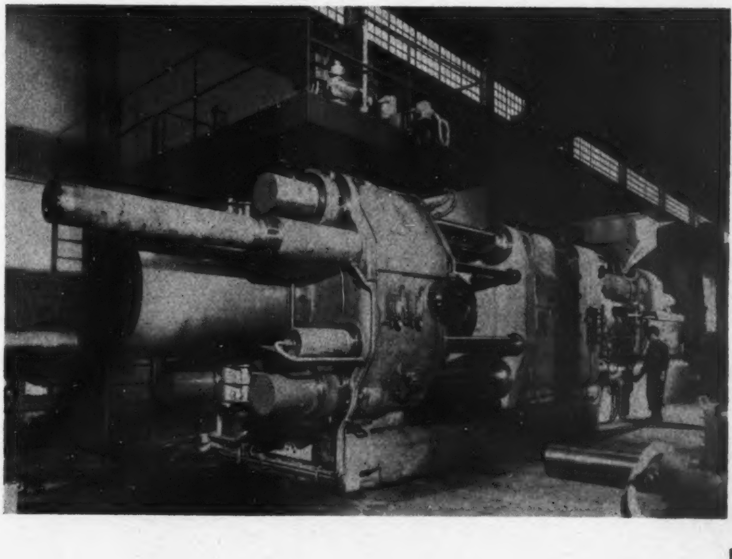
Built by Triulzi, Milan, the injection moulding machine here shown has a clamping force of 2,500 (short) tons, and an injection capacity of 425 oz. It is stated that the first three machines of this size have been ordered by a German company for the production of inner casings for refrigerators. For these items the output is 30 per hour, and the machine is suitable for producing other large mouldings for domestic applications.

The machine is designed to operate on an automatic cycle, but the various movements can be controlled separately, when required, by push-buttons. A maximum injection force of 220 tons can be applied, which, with a standard injection plunger, corresponds to an injection pressure of 22,000 lb. per sq. in. With this pressure, and the high injection speeds obtainable, it is claimed that thin-walled mouldings can be produced from any thermo-plastic material.

Of cast steel, the main frame members are carried on a bed-plate made from rolled steel sections, and the rams and tie bar are ground and hard chromium plated.

Hydraulic equipment, including the valves and servo controls, is mounted on a platform above the reaction head. The electrical equipment is installed separate from the machine so that it is unaffected by vibration, and the control gear is enclosed in a sealed housing which provides protection, against the ingress of dust and temperature variations.

Triulzi moulding machines are handled in this country and the Commonwealth by Baker Perkins Granbull, Ltd., Kingston-on-Thames.



This Triulzi moulding machine, which will be employed for the production of refrigerator casings, has a capacity of 425 oz.

Fillet-rolling Operations on Diesel-engine Crankshafts

By W. EGGER*

AT THE FORD TRACTOR and Implements Division Works, Highland Park, Mich., U.S.A., a single line of machine tools produces two different crankshafts for diesel- and petrol-engine tractors. The use of a dual-purpose line is unusual in that the diesel crankshafts are machined from 4145 steel forgings, heat-treated to 285-321 Brinell, whereas the petrol-engine crankshafts are shell-moulded nondular-iron castings. Both types, however, have practically the same dimensions. The shafts are 25·75 in. long, with four 2·3-in. diameter crank pins and three 2·5-in. diameter main journals. Throws are identical, since each engine has a displacement of 172 cu. in.

The first 16 machining and grinding operations on both crankshafts are similar. Subsequently, the petrol-engine crankshafts are finished on a Schraner lapping machine, washed, and oiled, in readiness for assembly.

Diesel-engine crankshafts, on the other hand, are first demagnetized, and then washed to remove chips. After the oil holes have been plugged, all crankpin and main journal fillets are rolled on the Schraner fillet-rolling machine seen in Fig. 1. Next, the crankpin and main journals are burnished to 10 to 12 micro-inches. After being again washed, the crankshafts are coated with an anti-rust compound.

Following the lapping or rolling operation, finish is checked with a Profilometer, and visual inspection is carried out to ascertain whether the fillet radius is correctly blended with the journal. Occasionally, crankshafts are tested to destruction to determine the hardness values of the fillets, journals, and core, also to check the tensile and fatigue properties.

Preliminary investigations showed that roll burnishing would produce a high-quality finish on the journals, and that fatigue strength could be further increased by rolling the fillets. Ford engineers at first attempted to combine roll burnishing and fillet rolling in a single operation on a master-crank type of machine. It was quickly ascertained, however, that normal tolerance variations in journal width and in fillet accuracy precluded simultaneous rolling. Despite the high hydraulic pressure (450 lb. per sq. in.) employed, it

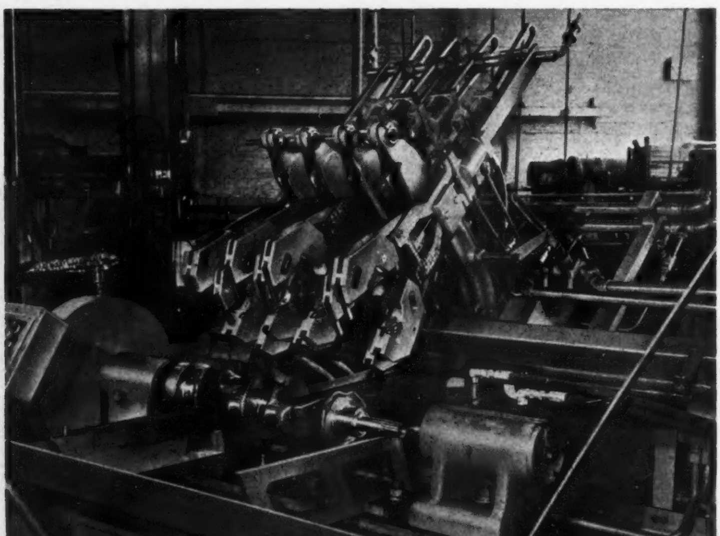


Fig. 1. The fillet-rolling machine with a crankshaft in position. Crank throws match the head settings but the hydraulic tailstock has not yet been advanced. After the roller shoes have closed on the crankpin and main journal fillets, the clamping arms are released, leaving the heads free to reciprocate with the throws as the shaft rotates

* Schraner Division, The Foote-Burt Co., U.S.A.

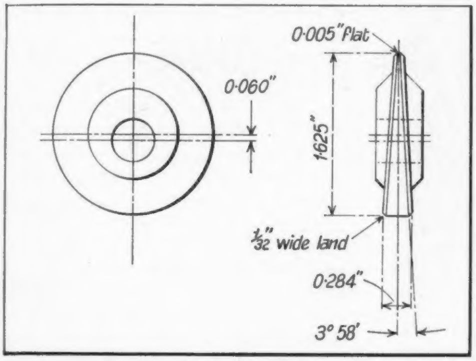


Fig. 2. Dimensions of the wedge-shaped fillet rollers employed. These rollers are of oil-hardening tool steel, heat-treated to 62 to 65 Rockwell C

was barely adequate to burnish the fillets and journals, and insufficient to compression-roll them to obtain added fatigue strength.

Tests have shown that as a result of rolling, fillets are pre-stressed in compression, with the result that tensile and impact forces in service are counteracted. The fillet rolling action does not need to be very deep. It is only necessary to deform, plastically, surface layers of the metal and work-harden the fillet to a depth of 0·0001 to 0·0005 in. The rolling increases hardness from 34 to as much as 55 Rockwell C (as converted from the superficial hardness scale). In addition, the kneading action of the rollers improves surface finish, from 30 to 12 micro-inches or less.

To deform metal plastically, high compressive force is required. With the Schraner equipment, however, the desired result is achieved by applying relatively low force hydraulically to an eccentric, wedge-shaped roller having a small contact area, as indicated in Fig. 2. As the roller rotates on its pin, following the fillet, the narrow portion of the wedge rolls metal at the centre, as seen at *A* in Fig. 3. Rotation away from the wedge point works the fillet metal towards the extremities, as at *B* and *C*. Beyond the wide zone, the wedge shape works the fillet metal towards the centre.

Thus, as the shaft and roller rotate in contact, narrow lands on the roller circumference ride up and down on each side of the fillet with a " kneading " action. Only a few cycles are necessary to roll the entire fillet thoroughly and the floor-to-floor time is 26 sec. per crankshaft. Fig. 4, which is a close-up view of the tooling, shows how the rollers are mounted in the shoes.

The contact area of each roller is about 0·00027 sq. in., so that an applied force of only 175 lb. produces a compressive shear stress of 650,000 lb. per sq. in. to cause metal flow. A light oil lubricant prevents galling at this high pressure, and helps to ensure a good finish.

To permit uniform roller contact over the entire fillet surface, the preparatory grinding of the fillet must give a form which is circular within close limits. Although circularity of the fillet is at present held to ±0·0025 in. (half the specified drawing tolerance), an automatic wheel dressing operation is planned which will enable a radius of 0·120 to be maintained within ±0·001 in. Journal-width tolerance, however, may be as much as 0·015 in., since the free-floating action of the rollers compensates for such variation.

LOADING THE SHAFT AND PERFORMING THE FILLET-ROLLING OPERATION

To roll the fillets, the operator roughly positions one end of the crankshaft in the headstock of the machine, while the other end rests on a rail, as may be seen in Fig. 1. By means of a mark on the spindle, he aligns the throws with seven pre-positioned heads. Each head has a pair of arms which carry the roller shoes. The cycle is started by pressing a button and a carriage is then lowered to locate the shoes on their respective crankpins and main journals. Meanwhile, the tailstock is moved in to centre the shaft, and engage it

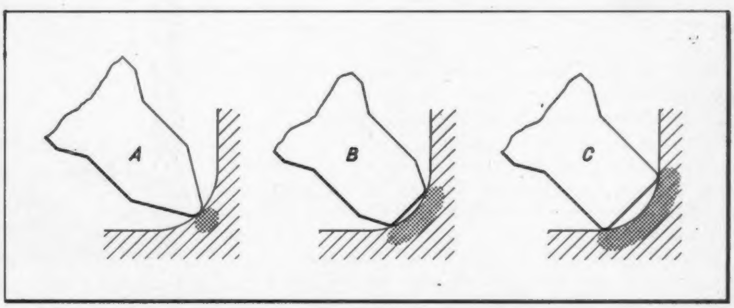


Fig. 3. The wedge-shaped roller is mounted eccentrically in its shoe, and the area of contact with the fillet changes continuously during rotation

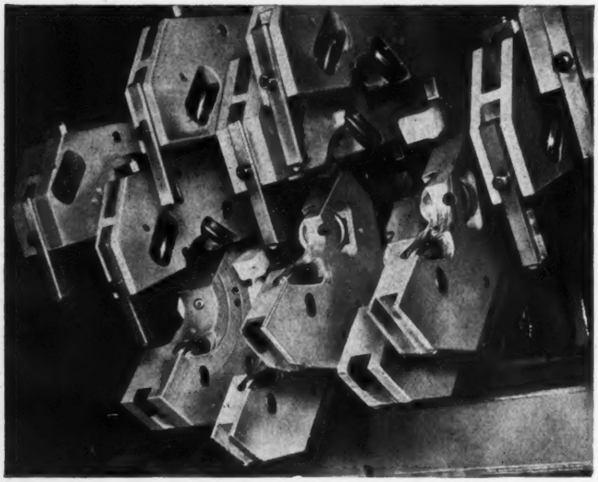


Fig. 4. Four rollers are mounted in each pair of opposed roller shoes, which close on each crankshaft journal and crankpin. The rollers are free to shift laterally by 0·015 in., to compensate for variations in journal width. They are diametrically opposed in the two fillets when the shoes are closed

with a locating pin in the driving spindle. When nylon bumpers in the throat of each head strike the journals, the shoes are closed and locked through a scissors linkage. This action pre-sets each roller to exert a force of 175 lb. Next, the arm clamps are released, and the crankshaft is ready for fillet rolling.

A second button is then pressed to start crank rotation at 150 r.p.m. The heads are free to reciprocate vertically, following the throws of the crankshaft as it rotates. After 11 revolutions, rotation is stopped automatically. Operation of a third button reclamps the arms in place to receive the next crankshaft, opens the roller shoes, withdraws the tailstock, and raises the carriage in readiness for the next cycle. Movements of the tailstock, carriage, arm clamps, and shoes are effected hydraulically.

When the shoes close, jets of a lard-base oil, from a row of nozzles mounted in the machine table, are directed upwards to lubricate the fillets and rollers. The flow is shut off when the shoes re-open.

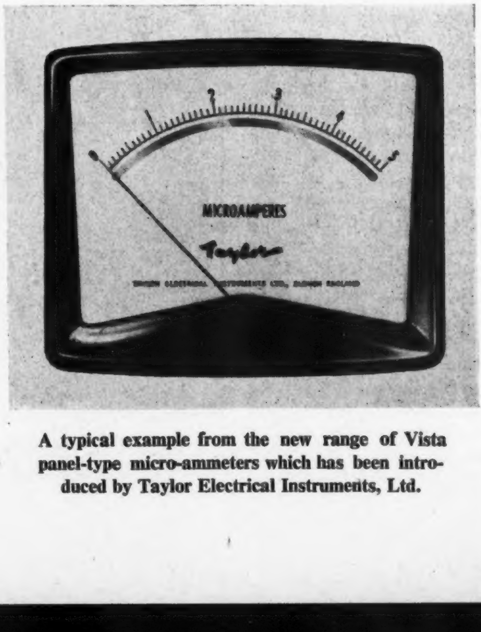
If the workpiece is incorrectly positioned, the operator can safely raise the carriage to seat it properly. Moreover, the relatively low hydraulic pressures employed ensure that the rollers, shoes, and slides are not damaged in such circumstances.

Occasional replacement of the wedge rollers is the only maintenance necessary. Ford have experimentally processed as many as 15,000 crankshafts with one set of rollers, but in production, rollers are reground after every 1,000 shafts.

New Vista Panel-type Meters

Taylor Electrical Instruments, Ltd., Montrose Avenue, Slough, Bucks., have recently introduced a new range of panel-type meters, a typical example of which is shown in the accompanying figure. The escutcheon moulding has been designed to provide an "open-face" dial which is shadow-less. Four versions are available, with scale lengths ranging from 1⅜ to 4½ in. and d.c. sensitivities from 5 micro-amps. The range also includes moving-coil a.c. and d.c. types with rectifiers, thermo-couples from 10 mA. to 5 amp., moving-iron versions from 10 mA. to 50 amp., and voltmeters from 10 amp.

Mirror scales and special scales to customers' requirements can be supplied, also knife-edge or spade-type pointers. The bases of all instruments in the range are designed so that the meters are interchangeable with standard meters of earlier designs.



A typical example from the new range of Vista panel-type micro-ammeters which has been introduced by Taylor Electrical Instruments, Ltd.

NEWS OF THE INDUSTRY

Bradford

Henry Milnes, Ltd., Ingleby Works, Rosse Street, inform us that the demand for their standard milling machines and centre lathes is well maintained, and that orders are being received for standard and special fine boring machines from both the home and export markets. In this connection it may be noted that one of these machines now under construction is destined for Brazil.

The standard heavy-duty fine borer, which has a 20-in. head traverse, a 30-in. table traverse, and a 15-in. vertical traverse, can now be supplied with the Ferranti co-ordinate positioning system, Hilger & Watts optical measuring equipment, and Microbore tooling.

New equipment at present being developed includes a square indexing table for the fine boring machine, provided with a push-button controlled locking device, and a push-button operated drawbar for the spindle. We hope to describe both these items at a later date.

Hindle Auto Products, Ltd., Caledonia Street, are extremely busy with the production of shaved and hardened and ground gears, splined shafts, and gearbox units. We are informed that the production of standard and special gearboxes now accounts for 40 per cent of the output. This company is also experiencing a heavy call on their services, from various sections of the engineering industry, for gear cutting from customers' blanks, including shaving and grinding, splining, broaching, and heat treatment, and it may be noted that a 7- to 10-day service is provided by the contract spline-cutting and broaching departments.

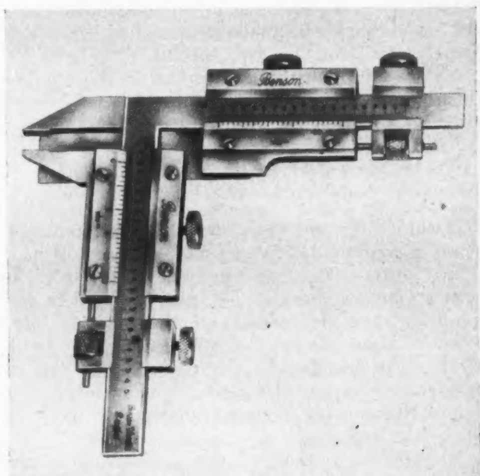
To overcome the effects of a shortage of skilled labour this company has recently carried out a re-equipment programme in the works, and machines installed have included a Churchill Redman P.5 hydraulic profiling lathe, a Ward No. 7 combination turret lathe, a Parkson Gearburr de-burring machine, and a Henry Milnes heavy duty fine borer with Hilger & Watts optical measuring equipment. We are informed that the results of this policy have so far been quite satisfactory, and that during the past year an increase in production of 20 per cent per man-hour has been obtained.

Benson Verniers, Ltd., Carlton Street, whose products include vernier gauges of all types, calipers, steel beam trammels, and die makers' squares, have experienced a good demand for all their products during the past year.

The gear tooth vernier, as shown in the accompanying illustration, has recently been re-designed, and is now of the solid beam form, and is fitted with a type "B" vernier scale to B.S. 887:1950.

In recent months there has been an increase in the volume of orders for the triangular beam vernier height gauge. In addition, increasing calls have been made on the company's services as suppliers of machine tool dials and graduated scales with hard chromium finish.

A machine shop extension of some 3,250 sq. ft. has recently been completed, and new equipment installed includes a Churchill grinding machine with a 42-in. long by 12-in. wide table. A number of milling machines and grinding machines is at present on order for this section, including a Jones & Shipman 540 grinding machine and a Parkson



The latest Benson solid beam gear tooth vernier is provided with a type "B" vernier scale to B.S. 887:1950

No. 2.V. vertical miller. Work has now begun on a further extension to which we hope to make reference at a later date.

CROFTS (ENGINEERS), LTD., Thornbury, are fully occupied with the manufacture of a wide range of products including couplings, Radiation gear reduction units, V-belt drive units, and Ritespeed motorized conveyor pulley units. The contract gear cutting department and the ferrous and non-ferrous foundries are reported to be working to capacity. We were informed, however, that there has been a slight falling-off in the volume of orders for clutches and universal-mounting worm reduction units, during the past few months.

T. BOWERS & CO., LTD., Thornbury Street, are experiencing a heavy demand for jigs, fixtures, gauges, press tools and special tooling, and are maintaining a steady production of small tools in the standard range. Orders from Norway and Sweden are at present in hand for the recently introduced internal micrometer, and it is stated that many enquiries for this instrument have been received from various countries in the Near and Far East and in North and South America.

N. JOWETT & CO., LTD., Littlemoor Works, Queensbury, are busy with the production of their thread milling and gear hobbing machine. A long-bed thread milling machine was recently despatched from the works, and a similar machine, with a capacity for milling and splining work up to 55 in. long, is at present in production, together with a number of standard machines of 7⅜-in. diameter by 28-in. length capacity.

We are informed that an increase in the number of enquiries for this machine has recently been noted, particularly from export markets. Other activities of this company include precision machining, on a contract basis, of a wide variety of component parts for several branches of industry.

STANHOPE ENGINEERS, LTD., 92 Harris Street, report a continued request for their range of gear pump units. We are informed that there has been an improvement in the volume of orders and enquiries from overseas, and that pumps have recently been despatched to India and South Africa. An increase in the demand for fuel-oil transfer pumps has also been experienced, and a steady volume of contract machining work is being handled.

In addition, the company builds special machinery to the designs and specifications of various customers.

MOORE MANUFACTURING CO., LTD., Blanche Street, are busy with the production of their range of engineers' small tools which includes milling cutters, milling machine arbors and adapters, lathe centres, drill sleeves and sockets, end mills, and reamers. We are informed that a certain amount of re-equipment is at present being carried out, and that recently installed machines have included a Praehoma double table type surface grinder and three Cincinnati milling machines. In addition, two Parkson type 2N milling machines are to be provided in the near future.

R. SUTCLIFFE.

London and the South

SETON CREAGHE ENGINEERING CO., LTD., Park Royal Road, N.W.10, have developed a compact push-button switch which has many applications in the electronics industry. Switching arrangements may be varied to suit different circuit requirements, and provision can be made for illumination of push-buttons either before or after operation. Any number of buttons from two to 16 may be provided in a bank, and they may be interlocked mechanically or electrically. The latching and release mechanism, it is stated, is designed to provide for reliable operation over extended periods, and it is so arranged that not more than one push-button at one time, in each bank, can be pressed into the locked position. This type of switch is finding increasing application for controlling electrical circuits in production lines.

Another product of the company is the Secray cleaning unit, which is intended for removing soil from precision ball bearings, jewelled bearings, and instrument components, for example. The parts are enclosed in the unit and heated by hot air issuing from a jet. Next they are sprayed with a cleaning solvent, and are finally dried, by a further application of hot air, prior to being enclosed, while still warm, in polythene bags, which are afterwards sealed.

WATSON MANASTY & CO., LTD., Orleans House, Manor Road, Teddington, Middlesex, report a continued demand for their Shadomaster range of optical projectors from the home and overseas markets. This range includes the VMP vertical measuring projector which is intended for use in tool-rooms and metrology departments; the type CRP Mk. 2 vertical projector, which may be employed for repetition optical gauging and direct measurement; and the Junior, Minor, and Magnum projectors for bench or wall mounting. A steady call is reported for Shadomaster translucent machine-ruled charts which are prepared from master layouts produced on a 30-in. by 23-in. co-

ordinate ruling machine, designed and constructed by the company and installed in a temperature-controlled room. Facilities are available for the production of special charts and component fixtures for use with Shadomaster and other projectors.

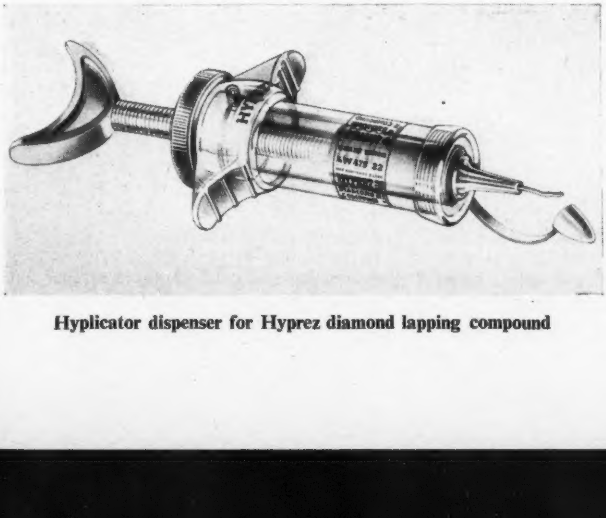
HIGH SPEED SERVICE TOOL CO., LTD., 86 Maple Road, Surbiton, Surrey, have a wide variety of medium-sized and small press tools in progress for firms in many parts of Britain, also for customers in the U.S.A. Many press tools are supplied by the company for the production of parts of complicated shape for typewriters, calculating machines, and electrical equipment. Machining operations required on components for a large proportion of the press tools include the profile-grinding of mating and interlocking surfaces, for which purpose Jones & Shipman type 540 grinding machines, fitted with Optidress wheel forming attachments by Precision Grinding Ltd., are largely employed.

The jig boring section is equipped with a number of modern machines, including one by Hauser. In the main shop an 8-in. stroke Butler slotting machine has recently been installed, also a GKN type B2 spark-erosion machine. Delivery of a 100-ton press is awaited, which is to be employed chiefly for trying-out press tools. The plough grinding service which this firm has operated for many years is in steady demand by regular customers in the locality and in distant areas, and urgent work is frequently undertaken.

F. W. HERRIDGE.

Dispenser for Lapping Compound

With the Hyplicator dispenser recently introduced by Engis, Ltd., Gabriel's Hill, Maidstone, Kent, Hyprez diamond lapping compound made by the company, can be applied to workpieces in accurately-controlled amounts, so that waste is avoided. Shown in the illustration, the dispenser will take a quantity of compound weighing 5 gm.



Hyplicator dispenser for Hyprez diamond lapping compound

For dispensing compound through the small-diameter nozzle, a neoprene plunger is advanced within the body by rotating a knurled, internally-threaded ring which engages with a screw. In this way, the movement of the plunger, and consequently the amount of compound which is passed through the nozzle, can be accurately controlled. The body, nozzle, screw, and adjusting ring are made from nylon, and since there are no metal parts in the dispenser, the risk of contamination of the compound is avoided. The partly-spherical end of the plunger has a radius slightly greater than that in the nozzle, and with this arrangement, all the compound can be discharged from the body. The nozzle may then be removed from the body, and fitted to another freshly-loaded dispenser if required, so that none of the compound within the nozzle bore need be wasted.

For finishing operations on parts made from certain metals, such as beryllium, which produce a toxic dust, the work is usually enclosed in a cabinet, fitted with glove attachments to take the operator's hands. When such work is being undertaken, the dispenser may be housed in the cabinet with the work, and the knurled ring can then be rotated, for discharging compound through the nozzle, by a friction disc driven by a remotely-controlled motor.

Hyprez lapping compounds are available with diamond particles in 12 different sizes from 0·1 to 90 micron (0·000004 to 0·0036 in.). The particles are suspended in paste which is supplied in different colours to facilitate identification of the various grades of compound.

N.R.D.C. Report

In the eleventh annual report of the National Research Development Corporation, some information is given concerning individual projects on which work was in progress or was started during the period July, 1959, to June, 1960.

Attention is drawn in the report to the Atlas computer project which was initiated last year and is based on techniques for very high-speed computer circuits that have been developed at Manchester University. The computer is designed for processing large amounts of scientific and commercial data at extremely high speeds. Building of the prototype is well advanced. The development of the Emidec 2400 computer for commercial data processing has been almost completed and the first machines are due for delivery this

year. Recently, the Corporation has set up a small study team to consider the possible applications of computers in the shipbuilding industry. The work of the study team is being carried out with the assistance of the Department of Scientific and Industrial Research and is expected to occupy a period of about six months.

Development work continues on the improved rolling mill incorporating hydrostatic bearings, which is the result of a proposal by Prof. H. Ford and Dr. A. Cameron, Imperial College of Science and Technology. A study of bearing characteristics has enabled parts to be designed for experimental evaluation on a 4-in. two-high mill at the College.

Reference is made in the report to experimental work on the direct generation of electricity by a thermionic method. This project was proposed by Prof. D. Gabor, Imperial College of Science and Technology, and promising results have already been obtained.

A short programme of development in connection with the Perry steplessly-variable speed gear has been sponsored by the Corporation and patent rights for certain design features in countries outside the British Commonwealth may be sought, with a view to granting licences for these inventions in the countries in question.

The Clerk regenerative mechanical transmission system is in an advanced stage of development and it is reported that trials of a prototype transmission in a vehicle are planned in the very near future.

The report is available from H.M. Stationery Office (price 1s. 3d.).

New Works for Payne Products

Payne Products International, Ltd.—a subsidiary of the Crane Packing Co., Morton Grove, Illinois, U.S.A.—have recently occupied new works, with a floor space of 10,000 sq. ft., at Buckingham Avenue, Trading Estate, Slough, Bucks., which were formally opened by Sir Leslie H. Robinson, K.B.E., Board of Trade.

Formed in 1954, the company handles the sales in the United Kingdom and Europe of the flat lapping machines in the Lapmaster range developed by the parent firm. Lapmaster machines with lap diameters of 12, 24, 36, and 48 in. are built in this country for Payne Products International, Ltd., and 72- and 84-in. machines in the range, for handling components up to 27¾ and 33 in. diameter, can be supplied by the Crane Packing Co.,

As has previously been described in MACHINERY, parts to be lapped on Lapmaster machines are accommodated within the bores of conditioning rings, which rotate in contact with the top surface of the lap while the operation is in progress, and pressure is applied by means of weights. The conditioning rings can be adjusted towards and away from the centre line, and serve to maintain the working surface of the lap accurately flat. With this arrangement, workpieces can be held to within one light band (0·0000116 in.) for flatness, and surface finishes down to 2 to 3 micro-inches, r.m.s., can be obtained when lapping is being carried out on a production basis.

This photograph, taken on the occasion of the opening of the new factory of Payne Products International Ltd., shows (left to right) The Mayor of Slough (Mrs. E. Scott-Picton), Mr. L. P. Hulin, managing director, and Sir Leslie H. Robinson

Although Lapmaster machines are usually employed for lapping flat surfaces, one machine has recently been supplied with a special fixture for lapping spherical components. On another machine, the top surface of the lap was machined to a convex shape of 80 in. radius for lapping a concave land on a ring-shaped part. For this operation, the pressure plates are held in contact with the work at an angle to the lap centre line.

Precision lapping of components for customer firms will continue to be carried out on a contract basis at the new works, and an air-conditioned room is provided for the production of optical flats on Lapmaster machines. It may be mentioned that a special interferometer, developed by

Sheffield University, has been installed for checking optical flats. Part of the works will be devoted to the production of Lapmaster 12-in. lapping machines.

The company is the agent in this country for the Swiss-made Diavite Microtester for the measurement of surface finish (see MACHINERY, 95/520—16/9/59), and can supply a monochromatic lamp unit for checking lapped components for flatness with the aid of an optical flat. Lapping of components on a contract basis is also carried out at works which have recently been established by the company at Huddersfield and East Kilbride.

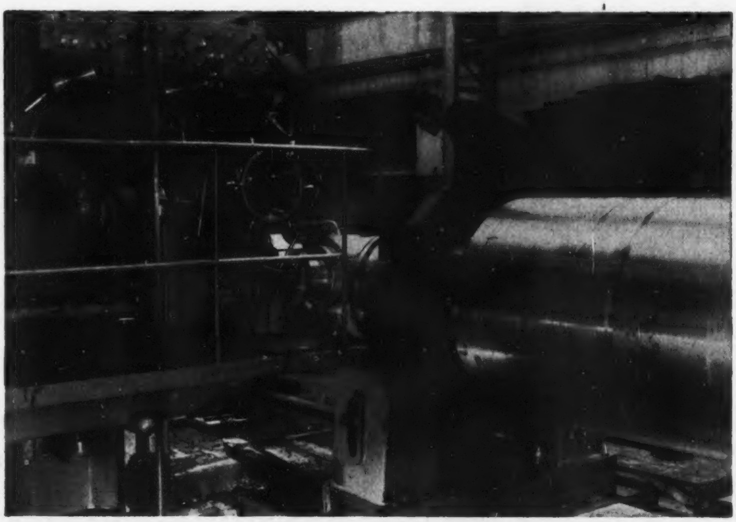
Armstrong Whitworth Extension

To meet increasing demands from the steel industry for cast-steel rolls, Armstrong Whitworth (Metal Industries), Ltd., Close Works, Gateshead-upon-Tyne, 8, are providing additional production space and equipment at a total cost of £300,000. A new building, 270 ft. long by 70 ft. wide, has been erected, and extensions are being made to the foundry. The new building, which was erected by Wright, Anderson & Co., Ltd., Gateshead, is served by an overhead gantry crane (Cowans Sheldon & Co., Ltd.) with a 50-ton main hoist and a 7½-ton auxiliary hoist.

A number of heavy-duty machine tools has been installed, including a Richards vertical turning and boring mill with a 6-ft. diameter table; a 120-h.p. Craven roll-turning lathe for workpieces up to 55 in. diameter by 25 ft. long; and another lathe, by the same company, which will accept rolls up to 64 in. diameter by 28 ft. long. This latter machine has a 150-h.p. driving motor and an independent unit for internal threading operations in the ends of rolls. Selsyn electrical equipment is employed for synchronizing this threading unit with the headstock spindle.

Another interesting addition to the equipment is a Craven horizontal milling machine, a close-up view of which is shown in the accompanying figure. A feature of this machine is that palm-ends of rolls can be machined on the side and end faces, and spade driving slots can be milled, at one set-up, an overhead attachment being employed for the latter operation. For milling the palm ends, an 18-in. diameter facing cutter is used, and the machine has a wide range of feed rates and spindle speeds.

It may be noted that the company is awaiting delivery of a large German-built roll grinding machine, which will accept work up to 40 in. diameter by 20 ft. long.



Close-up view of a large Craven horizontal milling machine which is installed at the Close Works of Armstrong Whitworth (Metal Industries), Ltd., for operations on rolls for steel mills

Standards for Hobs and Screw Gauges

BRITISH STANDARD FOR GEAR HOBS: PART 2: HOBS FOR GEARS FOR TURBINE REDUCTION AND SIMILAR DRIVES (B.S. 2062: PART 2: 1960). Basic dimensions for hobs required for the production of gears for turbine reduction and similar drives are now recommended for the first time in this revised specification. It has not been possible to achieve complete agreement on the dimensions, but recommended dimensions are given for the tooth forms and pitches listed in B.S. 1807: Part 2 (which relates to gears for turbines). These dimensions are suitable for the larger hobbing machines used for this type of work. Recommended arbor dimensions are also included to ensure correct fit between hob and arbor.

As in the previous edition, accuracy requirements are laid down. The permissible errors given are similar to those in the previous edition but the layout of the table has been improved to make it comparable with that in Part 1 of the standard, a revision of which was published in 1959.

BRITISH STANDARD FOR SCREW GAUGE LIMITS AND TOLERANCES: PART 1: GAUGES FOR SCREW THREADS OF UNIFIED FORM (B.S. 919:1960). When the 1952 edition of B.S. 919 was prepared, it was not considered necessary to make any distinction between the tolerances for Unified thread gauges and those for, say, Whitworth form thread gauges.

Experience has since shown, however, that some of the problems which arise in gauging Unified threads are different from those which may occur with other threads, and it has accordingly been thought desirable to separate the requirements for Unified gauges from those for other thread gauges. B.S. 919 is therefore being reissued in several parts, of which this—the first—deals only with gauges for Unified threads. In the preparation of the standard, every effort has been made to reconcile, as far as possible, differences between British and American practice in gauging Unified threads.

In addition to tolerances for types of gauges already in general use in this country, tolerances are also given for adjustable screw ring gauges and the associated setting plugs. The magnitude of these tolerances and of those for "go" and "not go" screw plug gauges is in accordance with the American Standard ASA B1.2 (1952), except for the pitch tolerances of the gauges, which are somewhat smaller.

The standard contains information on the functions of the various gauges and includes a section on the inspection of product threads. An appendix gives details of a recommended system of gauges for coated screw threads.

Copies of these standards may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W.1. The price of B.S. 2062: Part 2: 1960, is 10s., and of B.S. 919: Part 1: 1960, 17s. 6d. Postage is charged extra to non-subscribers.

World Exports of Manufactures

The Board of Trade Journal for January 20 gave provisional figures of exports of manufactures by 11 leading countries in the period January to September, 1960. The United States heads the list with 8,458 million dollars, and the Federal Republic of Germany follows with 7,278 million dollars. The United Kingdom is third with 6,295 million dollars, and is followed, in order, by France, Japan, and Italy. Figures are also given for percentage changes as compared with the corresponding period of the previous year, and it may be noted that the exports of Italy increased by 47·8, of France by 28·3, of Japan by 21, and of Sweden by 19·5 per cent. Of the countries listed, all showed increases, and the rise in the aggregate total was 18·3 per cent. The United Kingdom with 9·3 per cent had the smallest increase of any country listed.

Industrial Notes

G. ELTHERINGTON & CO., LTD., Burdwell Works, Brockholes, near Huddersfield, inform us that they have received an order from overseas for 23 Ferracute transfer presses of 53 tons capacity, valued at nearly £30,000.

THE GAUGE AND TOOL MAKERS' ASSOCIATION, Standbrook House, 2-5 Old Bond Street, London, W.1. A party of 48 directors of member firms will visit Moscow while the British Trade Fair (May 19 to June 4) is in progress.

PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London, W.C.2, are to take over for the office staff of Philips Electrical Industries, Ltd., five floors of the new 11-storey Berkshire House, which stands at the junction between High Holborn and Endell Street, only 50 yards from Century House.

THE EXPORT CREDITS GUARANTEE DEPARTMENT, 59-67 Gresham Street, London, E.C.2, report that export business insured under the "commercial" scheme in 1960 reached the record total of £694·5 million, which represented an increase of 8·8 per cent on the figure for 1959. This result was achieved despite the fact that for the last quarter of the year shipments declared for export were lower by £5 million than in the corresponding 1959 period.

VAUXHALL SUGGESTION AWARDS.—Six maximum awards of £450—the highest number in any year since the scheme was introduced in 1942—were paid to employees of Vauxhall Motors, Ltd., Luton, for cost-saving suggestions last year. A further 26 suggestions each earned an award of £100 or more. During 1960, the company paid out a total of £13,649 for 1,004 successful suggestions, out of 5,159 considered.

LANSING BAGNALL, LTD., Basingstoke, Hants., will show nine of their materials handling vehicles at the British Trade Fair to be held in Moscow in May. These exhibits will include a Rapide FOER5 electric fork truck which, it is stated, will operate on soft, uneven, ground, and in 10-ft. aisles; will travel at speeds up to 13 m.p.h.; and will lift loads up to 3,000 lb. Six of the vehicles, together with equipment, will be transported from the works to Moscow in one of the company's articulated lorries.

THE ELECTRICAL RESEARCH ASSOCIATION LABORATORY, Cleeve Road, Leatherhead, Surrey, recently published issue No. 12 of their house journal "Co-operative Electrical Research." It includes articles concerned with thermal deterioration of insulation; discharges in oil-paper insulation; the new E.R.A. committee structure; and test buildings for heating research. There are also notes on recent E.R.A. reports. Copies of the journal are obtainable from the Sales Department at the above address (price 2s. 6d. plus 6d. postage).

SWISSTOOL AGENCY ARRANGEMENTS.—In MACHINERY, 98/108—11/1/61, reference was made to agency arrangements for machines built or factored by Swisstool, Ltd., Zurich. In this connection we are asked to state that the agency agreement with Dowding & Doll, Ltd., 346 Kensington High Street, London, W.14, for sheet metal notching machines and Benninger universal thread milling machines, covers the whole of the United Kingdom, including Scotland.

RUBERY OWEN & CO., LTD., P.O. Box 10, Darlaston, Wednesbury, Staffs., are to discontinue the production of the Rubery Owen press brake guard, and this business is now being wound up. Guards at present on order will be completed and orders for a limited number of guards (twelve) for completion between now and the end of April next, will be accepted. The company will also continue to supply spares during the next twelve months, but from the end of April it will not be able to give maintenance service.

NEW BLAST FURNACE FOR FORD MOTOR CO., LTD.—Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees, one of the companies in the Davy-Ashmore Group, have been awarded a contract by the Ford Motor Co., Ltd., Dagenham, to construct a new blast furnace with a hearth diameter of 20 ft. This furnace will be the 50th that Ashmore's have constructed in the United Kingdom and overseas during the past thirty years, and the order has come from the customer to whom the first was supplied. It is planned that the new furnace will go into production in the summer of 1962.

Courses on Ergonomics

The 6th course on ergonomics (the design of equipment for human use) organized by the Engineering Employers' West of England Association, Department of Work Study and Staff Training, Engineers' House, The Promenade, Clifton Down, Bristol, will be held from February 27 to March 10. It will be conducted by Mr. K. F. H. Murrell, M.A., a member of the Department of Psychology at Bristol University, and the number attending will be limited to 12, to permit thorough discussion and enable some practical work to be carried out. Full particulars can be obtained from the above address.

A further course will be held from November 20 to December 1.

Obituary

MR. J. D. COLDWELL, chief designer for Conveyancer Fork Trucks, Ltd., Liverpool Road, Warrington, died recently at the age of 56.

Correction

The address of Lanarkshire Bolt, Ltd., was inadvertently omitted from the advertisement for that company which appeared on page 144 of MACHINERY for January 25. The address is Hamilton, Lanarkshire, Scotland (telephone, Hamilton 1241/5).

Personal

MR. A. VINCENT, B.Sc. (Eng.), has been appointed export sales manager of Dowding & Doll, Ltd., 346 Kensington High Street, London, W.14. He was formerly export manager of Clarke-Built, Ltd.

MR. B. B. MANN has joined Electrical Remote Control Co., Ltd., Bush Fair, Harlow, Essex, and will be concerned with the company's technical advisory service on the application of process timing equipment in industry.

DR. A. E. W. AUSTEN, B.Sc., Ph.D., A.M.I.E.E., F.Inst.P., has been appointed an executive director of C.A.V., Ltd., Acton, London, W.3. From 1946 he was chief research engineer for the company, and has held the position of chief engineer since 1959.

MR. D. K. FRASER, joint managing director of G. A Harvey & Co. (London), Ltd., Greenwich Metal Works, London, S.E.7, has been appointed managing director. MR. H. E. COOPER has relinquished his office of joint managing director but remains a director of the company.

MR. A. S. DICK, chairman of the Standard Motor Co., Ltd., Coventry, has been awarded the Benjamin Franklin Medal for 1961 by the Royal Society of Arts. This award has been made " for his contribution to industrial progress in the motor car industry."

MR. F. G. JAMES, who was formerly general manager (manufacturing) of St. Regis Paper Co., Providence, Rhode Island, U.S.A., has joined The Cincinnati Shaper Co., Ltd., Peel Park Place, East Kilbride, Glasgow, as assistant managing director and works director.

MR. R. A. SWARBRICK has been transferred to the London office of Sanderson Brothers & Newbould, Ltd., Newhall Road, Sheffield, where he now holds the position of sales representative, in succession to Mr. D. B. Goodchild who has taken up an appointment with another company.

MR. D. E. BANHAM, A.M.I.Mech.E., A.M.I.Prod.E., has joined Precision Gear Machines & Tools, Ltd., Red Ring Works, Bodmin Road, Coventry, as works manager, and will take up this appointment on February 13. For the past six years he has held the post of consultant with Associated Industrial Consultants, Ltd. Other new appointments which have been made by the company are as follows: MR. TERENCE G. COOMBS, A.C.W.A., previously with the Crane Division of K & L Steelfounders & Engineers, Ltd., as management accountant; MR. JOHN G. H. SHIACH, chief engineer with the Marine Department of the British Transport Commission, as plant engineer; and MR. JOHN B. HALL, A.M.I.Mech.E., as production controller.

Mr. D. E. Banham

MR. HAYDN HOLLYMAN has been appointed area representative for the Midlands for Smith's Industrial Division, Kelvin House, Wembley Park Drive, Wembley, Middlesex. He replaces the late Mr. V. P. Scholes.

MR. D. J. ROSE has been appointed area sales manager in charge of the Birmingham branch of Richard W. Carr & Co., Ltd., Pluto Works, Wadsley Bridge, Sheffield, 6, Mr. J. Leavesley Buxton, sales director, and Mr. J. W. Borland, area sales manager, having left the company. Mr. C. Cartwright will continue to hold the position of heat treatment superintendent.

Coming Events

THE PLASTICS INSTITUTE.—*Yorkshire Section.* February 8, at 7.15 p.m., at St. Mark's House, 186 Woodside Lane, Leeds 2; lecture on " Machining and Finishing of Plastics," by a representative of Ekco Plastics Ltd.

INSTITUTION OF WORKS MANAGERS.—*Leicester Branch.* February 7, at 7.30 p.m., at the Grand Hotel, Leicester; " The Dilemma of Incentives," by R. L. Webster.

INSTITUTION OF PRODUCTION ENGINEERS.—*Wolverhampton Section.* February 7, at 7.15 p.m., at Denbro, Ltd., Soho Hill, Handsworth, Birmingham, 19; lecture on " The Production of Form Tools," by D. W. Butchart. *Ipswich and Colchester Section.* February 10, at 7.30 p.m., in the Britannia Works Canteen, Davey Paxman Co., Ltd., Colchester; lecture on " Further Training of University Graduates with Particular Reference to Production Engineering," by S. H. Potter, B.Eng. *Coventry Graduate Section.* February 7, at 7.30 p.m., at Courtaulds Lecture Theatre, Lockhurst Lane, Coventry; lecture on " Automatic Equipment in the Metal Finishing Industry," by S. H. Grindrod. *Dundee Section.* February 8, at 7.30 p.m., at the Royal Hotel, Union Street, Dundee; lecture on " Small Quantity Flow Line Production," by E. Pennington. *Gloucester Section.* February 10, at 7.30 p.m., at the Wheatstone Hall, Brunswick Road, Gloucester; lecture on " Materials Problems in Nuclear Energy," by Dr. P. Murray, B.Sc., Ph.D. *Western Graduate Section.* February 9, at 7.30 p.m., in the Small Lecture Theatre, Faculty of Engineering, Queen's Building, University of Bristol, University Walk, Bristol 8; lecture on " Research into Human Performances in Industry," by Dr. S. Griew, B.Sc., Ph.D.

INSTITUTION OF MECHANICAL ENGINEERS.—*Industrial Administration and Engineering Production Group.* February 8, at 6 p.m., at The Institution, 1 Birdcage Walk, Westminster, London, S.W.1; papers on " The Influence of Measuring Force, Stylus Radius and Surface Finish on the Accuracy of Measurement of Workpieces by a Comparator," by L. W. Nickols and T. R. J. Oakley, and " An Investigation into the Accuracy of Industrial Measurement of Sizes Between 0·02 and 5 in.," by P. W. Harrison.

INSTITUTION OF PLANT ENGINEERS.—A general meeting will be held on February 7, at 7 p.m., at the Royal Society of Arts, John Adam Street, London, W.C.2; paper on " Standards in Plant Engineering," by Dr. E. L. Diamond, M.Sc. (Eng.), Ph.D., divisional chief technical officer, British Standards Institution.

Machine Tool Share Market

Stock markets were fairly active during the period under review, but after being firm for the most part, they became unsettled, and most sections finished on a dull note.

British Government stocks were well supported, and attention was directed to other high-grade fixed interest stocks at improving levels, but final prices were below the best.

A satisfactory tone prevailed in the commercial and industrial share sections. There was some irregularity in price movements, but the trend, in the main, was to higher levels. Towards the close, however, an easier tendency developed.

Among machine tool issues Edgar Allen advanced 6d. to 38s. 6d.; Birmingham Small Arms, 2s. 6d. to 43s.; British Oxygen, 1s. 6d. to 28s.; Chas. Churchill, 4½d. to 8s.; Coventry Gauge & Tool, 1s. 6d. to 25s. 6d.; Craven Bros. (Manchester), 3d. to 10s. 1½d.; B. Elliott, 6d. to 3s. 1½d.; John Harper, 1½d. to 8s. 3d.; Alfred Herbert, 3s. 9d. to 60s.; John Holroyd "B," 1s. 3d. to 15s.; Kerry's (Gt. Britain), 6d. to 10s.; Newall Engineering, 3d. to 6s. 6d.; Samuel Osborn, 3d. to 43s. 3d.; Stedall & Co., 3d. to 7s. 9d.; and Tap & Die Corporation, 3d. to 14s. 9d. On the other hand, Arnott & Harrison lost 3d. at 13s. 3d.; Asquith Machine Tool, 1s. 3d. to 10s. 3d.; Brooke Tool, 1½d. at 6s. 4½d.; Clarkson (Engineers), 1s. 3d. at 27s. 6d.; Greenwood & Batley, 6d. at 25s. 9d.; and Thos. W. Ward, 6d. to 65s. 6d.

ABWOOD MACHINE TOOLS, LTD.—Interim dividend 5 per cent (same).

ASQUITH MACHINE TOOL CORPORATION, LTD.—Dividend of 5 per cent for the year ended September 30, last.

Instrumentation and Productivity

The Society of Instrument Technology and the Birmingham Productivity Association will hold a one-day conference at the Birmingham College of Technology, Gosta Green, Birmingham, on March 29. Intended for manufacturers operating on a small to medium scale, the purpose of the conference will be to draw attention to various aspects of instrumentation which will increase productivity profitably. Papers will be concerned with the possibilities of increasing output from a given labour force; maintaining consistent quality of product by controlled measurement; and reducing scrap during processing by in-line inspection, including non-destructive testing.

An instrument exhibition will be staged in conjunction with the conference.

Further particulars can be obtained from Mr. D. Smith, I.C.I., Ltd., Metals Division, Kynoch Works, Witton, Birmingham 6.

COMPANY		Denom.	Middle Price
Abwood Machine Tools, Ltd.	Ord.	1/-	1/3
Allen (Edgar) & Co., Ltd.	Ord.	£1	38/-xd
,, ,,	5% Prf.	£1	14/6*
Arnott & Harrison, Ltd.	Ord.	4/-	13/3
Asquith Machine Tool Corp., Ltd.	Ord.	5/-	10/3
,, ,, ,,	6% Cum. Prf.	£1	18/9
Birmingham Small Arms Co., Ltd.	Ord.	10/-†	43/-
,, ,, ,,	5% Cum. "A" Prf.	£1	14/6
,, ,, ,,	6% Cum. "B" Prf.	£1	17/6
,, ,, ,,	4% 1st Mort. Deb.	Stk.	90¼
British Oxygen Co., Ltd.	Ord.	5/-	28/-
,, ,, ,,	6% Cum. Prf.	£1	20/-
Brooke Tool Manufacturing Co., Ltd.	Ord.	5 -	6/4½
Broom & Wade, Ltd.	Ord.	5/-	22/3
,, ,,	6% Cum. Prf.	£1	18/9
Brown (David) Corporation, Ltd.	5½% Cum. Prf.	£1	16/-
Buck & Hickman, Ltd.	6% Cum. Prf.	£1	18/-
Butler Machine Tool Co., Ltd.	Ord.	5 -	17/6
,, ,, ,,	5% Cum. Prf.	£1	14/3
Churchill (Charles) & Co., Ltd.	Ord.	2/-	8/-
,, ,, ,,	6% Cum. Prf.	£1	25/9‡
Churchill Machine Tool Co., Ltd.	Ord.	5/-	39/6
,, ,, ,,	6% Cum. Prf.	£1	18/-
Clarkson (Engrs.), Ltd.	Ord.	5/-	27/6
Cohen (George), 600 Group, Ltd.	Ord.	5/-	12/6
,, ,, ,,	4½% Cum. Prf.	£1	13/-
Coventry Gauge & Tool Co., Ltd.	Ord.	10/-	25/6xd
,, ,, ,,	5% Cum. Red. Prf.	£1	16/3
Craven Bros. (Manchester), Ltd.	Ord.	5/-	10/1½
Elliott (B.) & Co., Ltd.	Ord.	1/-	3/1½
,, ,,	4½% Red. Cum. Prf.	£1	13/-
Expert Tool & Case Hardening Co., Ltd.	Ord.	2/-	2/-
Firth Brown Tools, Ltd.	4% Cum. Prf.	£1	11/6
Greenwood & Batley, Ltd.	Ord.	10/-†	25/9
Harper (John) & Co., Ltd.	Ord.	5/-	8/3
,, ,,	4½% Red. Cum. Prf.	£1	12/3
Herbert (Alfred), Ltd.	Ord.	£1	60/-
Holroyd (John) & Co., Ltd.	"A" Ord.	5/-	16/3
,, ,, ,,	"B" Ord.	5/-	15/-
Jones (A. A.) & Shipman, Ltd.	Ord.	5/-	31/3
,, ,, ,,	7% Cum. Prf.	5/-	5/-
Kearney & Trecker-C.V.A., Ltd.	5½% Red. Cum. Prf.	£1	11/-
,, ,, ,,	Prefd. Ord.	£1	13/9
Kearns (H. W.) & Co., Ltd.	Ord.	5/-	17/6
Kerry's (Gt. Britain), Ltd.	Ord.	5/-	10/-
Macreadys Metal Co., Ltd.	Ord.	5/-	15/-
Martin Bros. (Machinery), Ltd.	Ord.	2/-	2/-
Massey (B. & S.), Ltd.	Ord.	5/-	10/-
Newall Engineering Co., Ltd.	Ord.	2/-	6/6
Newman Industries, Ltd.	Ord.	2/-	5/3
,, ,,	6% Prf. Ord.	5/-	5/-xd
Noble & Lund, Ltd.	Ord.	2/-	4/-
Norton, W. E. (Holdings), Ltd.	Ord.	2/-	3/3
Osborn (Samuel) & Co., Ltd.	Ord.	5/-	43/3
,, ,, ,,	5½% Cum. Prf.	£1	25/-
Pratt (F.) & Co., Ltd.	Ord.	5/-	14/9xd
Sanderson Kayser, Ltd.	Ord.	10/-	34/4½
,, ,, ,,	6½% Cum. Prf.	£1	18/-
Scottish Machine Tool Corporation Ltd.	Ord.	4/-	10/-
Shardlow (Ambrose) & Co., Ltd.	Ord.	£1	45/-
Shaw (John) & Sons, Wolverhampton, Ltd.	Ord.	5/-	16/3
Sheffield Twist Drill & Steel Co., Ltd.	Ord.	4/-	15/6
,, ,, ,, ,,	5% Cum. Prf.	£1	14/3
Stedall & Co., Ltd.	Ord.	5/-	7/9
Sykes (W. E.), Ltd.	"B" non-voting Ord.	10/-	24/-
Tap & Die Corporation, Ltd.	Ord.	5/-	14/9
,, ,, ,,	4½% Deb. 1961-1977	Stk.	84½
Wadkin, Ltd.	Ord.	10/-	18/9
Ward (Thos. W.), Ltd.	Ord.	£1	65/6
,, ,,	5% Cum. 1st Pref.	£1	14/6
,, ,,	5% Cum. 2nd Pref.	£1	23/-
Willson Lathes, Ltd.	Ord.	1/-	3/4½

The Middle Prices given in the list are in several cases nominal prices only and not actual dealing prices. Every effort is made to ensure accuracy, but no liability can be accepted for any error. * Sheffield price. † Ordinary £1 shares have been subdivided and are now Ordinary 10/- units. ‡ Birmingham price.

PRICES OF MATERIALS

All prices per ton except where otherwise stated.

Pig Iron

Foundry and Forge No. 3, Class 2

Middlesbrough (10 tons or over)	£21 17 0
Birmingham (10 tons or over)	£21 9 3

Phos. Over 0·1 up to 0·4%

Birmingham (6 ton lots)	£23 5 0
Grangemouth (6 ton lots)	£23 10 0

Hæmatite

English No. 1 (10 tons or over)

N.E. Coast (made in N.E.)	£23 19 0
Scotland	£24 5 6
Sheffield	£25 9 0
Birmingham	£25 13 0

Welsh 10 tons or over £23 19 0

Steel Products

Medium plates (50 tons andover)	£43 16 6
Mild steel plates, ordinary (50 tons and over)	£40 7 0
Boiler plates (50 tons and over)	£42 17 0
Flat bars, 5 in. wide and under (50 tons or over)	£39 1 0
Round bars, under 3 in. (50 tons or over)	£39 1 0
Billets, rolling quality, soft U.T. (100 tons or over)	£31 15 6

Phosphor Bronze

Ingots (2B8), (A.I.D. d/d £304 0 0

Copper

Cash (mean)	£217 17 6
Cold rolled and hot rolled sheets 4 ft. by 2 ft. by 10 SWG	£296 15 0—297 0 0
Rods, 5/16 in. to ¾ in. diam.	£311 0 0
Tubes, 1½ in. bore by 10 SWG, ton lots, per lb.	3s. 0⅞d.
Wire rod, black, hot-rolled (¼-5/16 in.), English	£233 7 6

Zinc

Refined, minimum 98 per cent purity, current month (mean) £79 1 3

Brass

Tubes, solid drawn, per lb.	1s. 9⅞d.
Strip 63/37, 6in. by 10 SWG coils, ton lots	£252 0 0—£255 0 0
Rods, ¼-3 in. diam. (59 per cent copper)	1s. 11¾d.

Yellow Metal

Condenser plates, per ton	£182 0 0
Rods, per lb.	2s. 0¾d.

Aluminium

Ingots, min. 99·5 per cent Canadian d/d £186 0 0

Tinplates

*U.K. Home trade:
Cold reduced, f.o.r. makers works (15-50 tons) £3 6 8

U.K. Export:
Hot rolled basis, f.o.r. works port 73s. 6d.—76s. 0d.
Cold reduced basis, f.o.r. works port 73s. 6d.—76s. 0d.

Gunmetal

Ingots, B.S. 1400 L.G.2, delivered £214 0 0

* Official maximum price, after allowing for adjustments for increase in price of tin.

MAKERS' PRICES

Hexagon Steel Bars[1]

Sizes in inches from 1 in. up to 2·21 and 2·41 a/f ex works, 2 ton basis	£42 17 0
Free cutting black	£47 6 6

Reeled Steel Bars[1]

Single-reeled, 1½ in. upwards, f.o.t. works (+ usual extra for sizes)	£43 9 6
Free cutting	£47 19 0

Precision-ground Mild Steel[2]

1-in. diam. + 0·00025-in. 4-ton lots, per cwt. 121s. 6d.

Bright Ground Stainless Steel Bars[3]

EN56AM (martensitic, free cutting)	£304 10 0
EN58AM (austenitic free cutting)	£377 10 0

Prices are basic, subject to extras

High-speed Steel

Black random length bar. All prices basic, per lb., subject to extras:

Molybdenum "66"	6s. 5d.
Molybdenum "46"	6s. 3d.
14 per cent tungsten	6s. 11d.
16 per cent tungsten	7s. 4d.
18 per cent tungsten	7s. 9d.
22 per cent tungsten	9s. 2d.
5 per cent cobalt	10s. 10d.
4·75/5·25 molybdenum + 6·0/6·75 tungsten + 1·75/2·05 vanadium per cent (5-6-2)	6s. 7d.

Precision-ground, High-speed Free-turning Brass Rod[2]

⅝-in. diam. ±0·00025-in., 2 ton lots, per lb. 2s. 9½d.

Grey Iron Rod

Die Cast[4] in random lengths 18 in. to 26 in. rough machined 1/16-in. above listed size. Extra for definite lengths. Discounts for orders over £150.

	Per cwt. net. Mark I	Mark III
¾ or ⅞ in.	260s. 3d.	338s. 3d.
1 or 1⅛ in.	208s. 4d.	267s. 3d.
1¼ to 1½ in.	146s. 3d.	181s. 7d.
1⅝ to 2 in.	112s. 7d.	133s. 6d.
2¼ to 3½ in.	97s. 1d.	112s. 9d.
3¾ to 12 in.	91s. 9d.	105s. 3d.

Continuous Cast

10-ft. lengths, centreless machined 1 to 3-in. diam. + 0·010 to 0·020 in., prices as quoted for die cast bar[4]

centreless ground +0·010 in. Extra	1 or 1⅛ in.	202s. 3d.†
for hardenable	1¼ to 1½ in.	142s. 0d.†
alloy iron[5]	1⅝in. to 2 in.	109s. 4d.†
Per cwt. net	2¼ to 3½ in.	94s. 3d.†

† All prices+3 per cent.

Stellite[6]

Welding Rods, plain

¼ in. diam., per lb. 30s. 0d.

Toolbits

¼ in. sq. × 4 in., each 22s. 3d.

1 Colvilles, Ltd., Glasgow, and 17 Grosvenor Street, London, W.1. 2 Pratt, Levick & Co., Ltd., Chester. 3 Spartan Steel & Alloys, Ltd., St. Stephens Street, Birmingham, 6. 4 Sheepbridge Alloy Castings, Ltd., Sutton-in-Ashfield. 5 "Flocast," Harold Andrews Sheepbridge, Ltd., Halesowen. 6 Deloro Stellite, Ltd., Highlands Road, Shirley, Solihull.

BASIC PRICES FROM LONDON STOCK[8]

Free Cutting Steel

Bright cold drawn:

(Usaspead) over 1 to 2 in.	£59 4 6
Lead bearing (Usaled)	£63 11 0
Precision ground, 1½ in.	£81 4 6

Bright Drawn

M.S. bars (M.M.C.) over 1½ to 2 in.	£56 10 0
Square edge flats (Usaflat)	£73 6 6
M.S. angles (Usaspead)	£100 6 6
Case hardening (EN) (Usacase) over 1½ to 2 in.	£62 10 0
M.S. bars (EN3B) (Usamild) over 1½ to 2 in.	£58 16 6
Carbon manganese semi-free cutting case hardening (EN202) (Usaspead 202) over 1½ to 2 in.	£71 5 0
35/45 ton tensile (EN6) (Usen) over 1 to 1½ in.	£67 3 0
0·4 carbon normalized (Usaspead "40") over 1½ to 2 in.	£69 5 0
0·45 carbon normalized EN9 (Usaspead 55)	£69 15 0
Carbon manganese steel to Specification EN16T (Usaspead 5565), per ton	£126 17 0

Ground Flat Stock

18-, 24-, and 36-in. lengths (Usaspead). List prices plus 5 per cent, less 5 per cent.

Oil Hardening Cast Steel

Non-shrink (Usaspead N.S.O.H.) ¾ in. to 2½ in., per lb.	1s. 11d.
Non-distorting heavy duty (Usaspead H.C.H.C.), ¾ in. to 2½ in., per lb.	4s. 2d.

Silver Steel

(0·194-in. to 1½-in.)

Genuine Stubs quality, per lb.	4s. 6d. + 5% less 27½%
M.M.C. quality, per lb.	2s. 7d. + 6½%
Boxes of 16 assorted sizes, 1/16 in. to ⅝ in. diam.	7s. 6d.

Stainless Steel

KE40AM (free cutting), per lb. 3s. 8d.

Glacier Machined Bronze Bars

Phosphor bronze (2B8), Lead bronze — Prices on application

High-speed Steel

18 per cent tungsten. Prices on application.

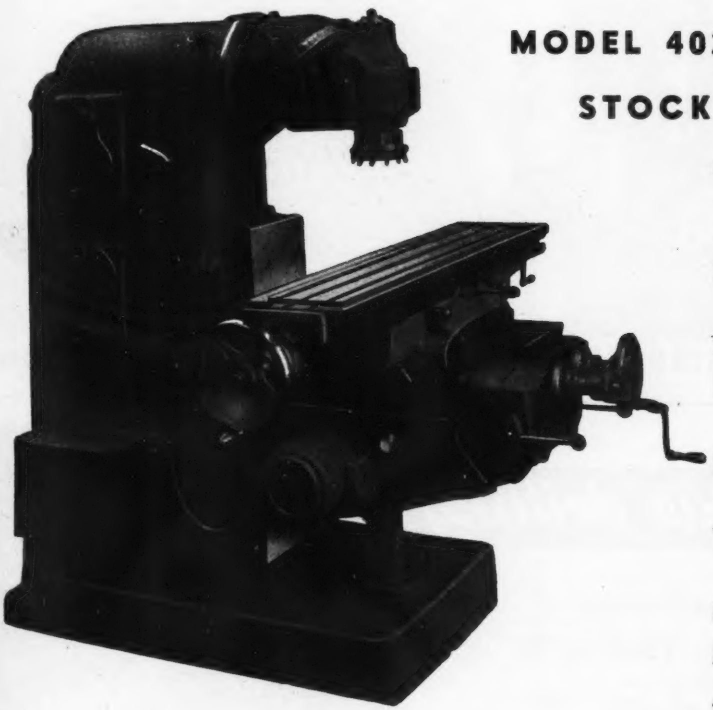
Toolholder bits:
Usaspead "Super", " "Supreme", " Cobalt 10 — List price

Shimstock

Steel assorted, per tin	3s. 6d.
Brass " "	7s. 3d.

8 Macready's Metal Co., Ltd., Pentonville Road, N.1. Subject to confirmation by London Office. Delivered free by van in London area.

P. HURÉ HIGH QUALITY UNIVERSAL MILLING MACHINES



MODEL 402A illustrated

STOCK DELIVERY

Brief Details:

19 SPEEDS
20 — 1,250 r.p.m.

24 FEEDS IN THREE DIRECTIONS

RAPID POWER FEEDS

TABLE 50" x 11½"

HEAD WILL SET TO ANY COMPOUND ANGLE

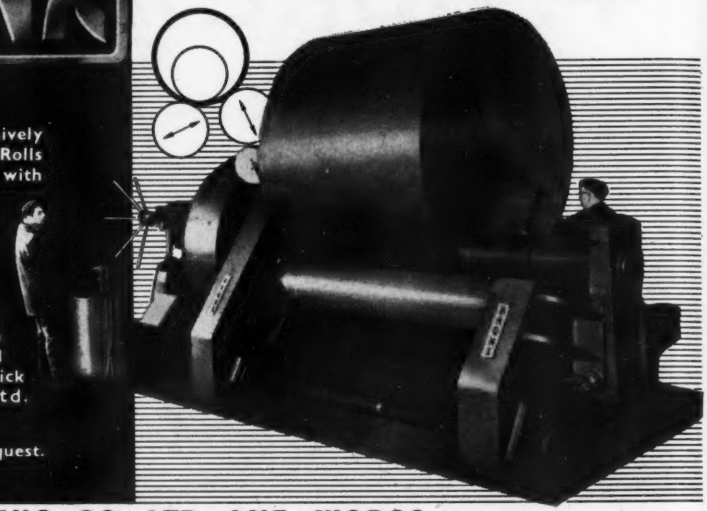
OTHER MODELS	KNEE TYPES			KNEELESS TYPES
TABLE SIZES	40" x 10"	59" x 13"	65" x 13"	98" x 23"
SPINDLE SPEEDS	24—1,800	16—1,000	16—1,000	10—1,000

SOLE AGENTS **— SOUTHERN ENGINEERING & MACHINERY CO.**

MILLBROOK - SOUTHAMPTON PHONE: SOUTHAMPTON 73101/2/3

BRONX

One pass rolling with PLATE BENDING ROLLS



There is a wide range of massively built Bronx Plate Bending Rolls to give consistent accuracy with thinnest to thickest steel plates up to 40 ft. in width, and standard machines cope perfectly with conical work. Illustration shows Bronx Initial Pinch Machine, Capacity 8 ft. x $\frac{3}{4}$ in., rolling a cylinder 7 ft. in diameter in ONE PASS from Mild Steel Plate 7 ft. in width by $\frac{1}{2}$ in. thick at Messrs. Hatchett & Co., Ltd. Hyde, Cheshire.

Illustrated literature on request.

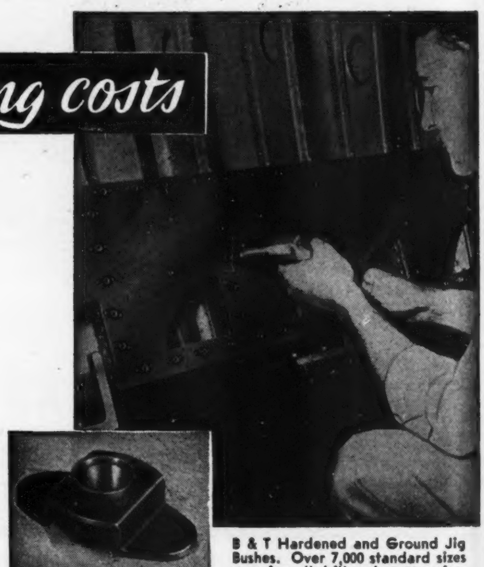
BRONX ENGINEERING CO. LTD., LYE, WORCS. *Telephone: LYE 2307 & 2308*

Lower your drilling costs

USE B & T ANCHOR BUSHING DRILL TEMPLATES

B & T Anchor Bushes are either welded or riveted to a thin steel or aluminium template thus providing a very low cost drill jig which is light to handle and which can be easily formed to suit any shape.

Write for full details and a copy of our new catalogue.



B & T Hardened and Ground Jig Bushes. Over 7,000 standard sizes covering all drill and reamer sizes up to $2\frac{1}{4}$ in. diameter. Our catalogue is available on request.

BONEHAM & TURNER LTD · MANSFIELD · NOTTS

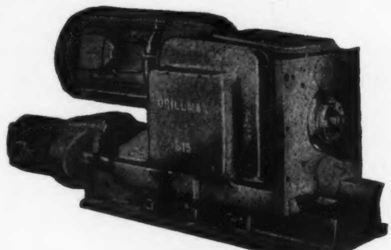
Telephone: Mansfield 896 (6 lines). Grams: 'STAMPERS' Mansfield

DRILLMAX

A Complete Range of STANDARD .... AUTOMATION EQUIPMENT

This unique range of equipment has been continually developed over many years and has been proved in practice.

Drillmax Standard Equipment is now widely used throughout Britain and is obtainable in most countries of the World through our local agents.

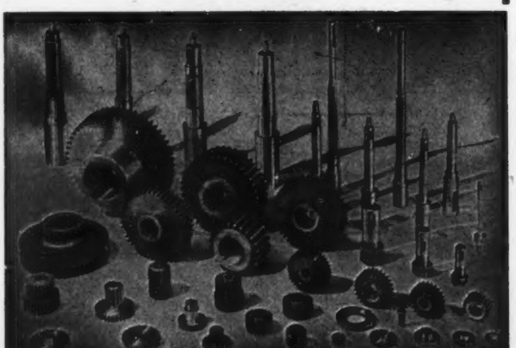


1

2

3

4



5

6

1 Model S.15 Screw Feed Unit Head (one of 4 Models)
2 Model C. Minor cam Feed Unit Head
3 Automatic Index Tables (Models in 6 sizes)
4 Standard Multi-Head, Spindles, Gears, Spacers, etc.
5 Model V series Universally Adjustable Multi-Heads
6 Model M series Adjustable Centre Multi-Heads

Illustrated literature available: upon request
Also available: Standard Wing Bases, Columns and Control Units.

PETER BRASSHOUSE LTD.

Drillmax Division, Leighswood Works, Leighswood Road, Aldridge, Staffs.
Telephone: Aldridge 52814-5.

2 SPEED DOUBLE ENDED GRINDING MACHINES

10" 12" 14" 16" & 20" MODELS

14" MODEL ILLUSTRATED

Our grinders are designed to give maximum work to wheel accessibility — incorporating heavy duty spindles running in double row self-aligning radial roller bearings.

Also Manufacturers of:—

High Speed Power Hacksawing Machines and

40 Ton Inclinable Power Presses

NORTON INDUSTRIES LTD.
Sales Division
STAFFORD HOUSE, NORFOLK STREET, STRAND, LONDON, W.C.2
Phone: Temple Bar 0681 Grams: Kilmach, Estrand, London

FULLER HORSEY
SONS & CASSELL

10, LLOYDS AVENUE · LONDON · E.C.3. Phone ROYAL 4861

BALANCING ARMATURES

at Crompton Parkinson, Chelmsford.

The latest
JACKSON-BRADWELL
MODEL 3E
ELECTRONIC DYNAMIC BALANCING MACHINE

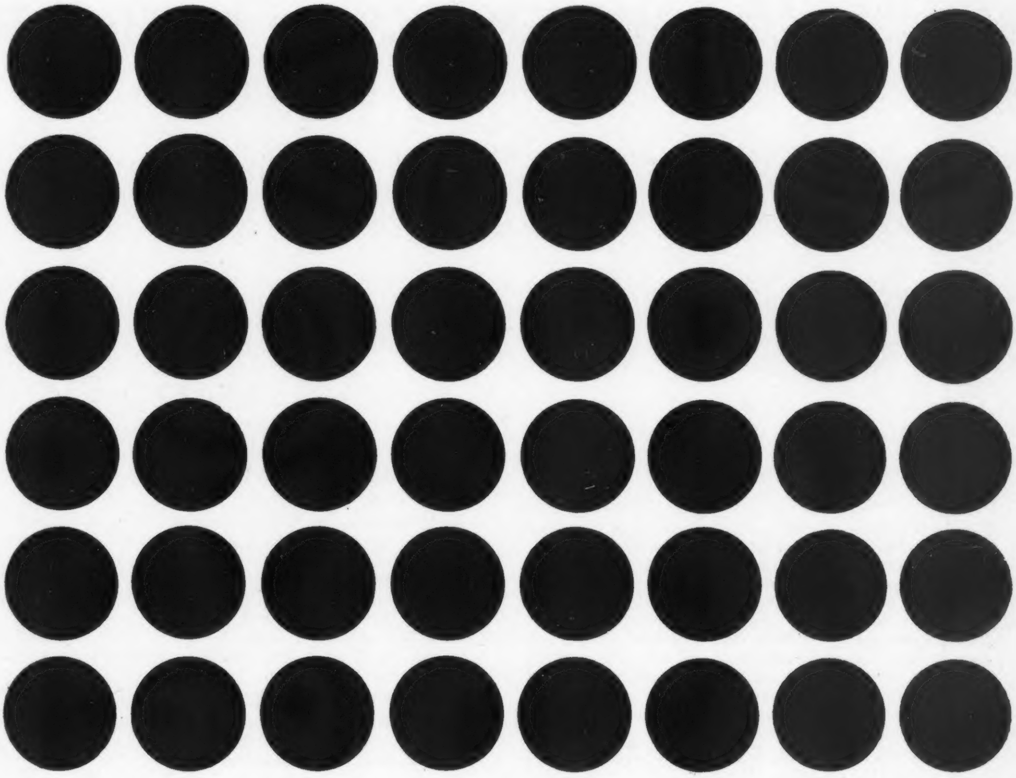
Ideal for heavy duty applications, the Model 3 E has a range from 200 lb. to 10,000 lb. Lengths of up to 10' and diameters of 84" can be balanced. This model is but one of an extensive range of electronic balancing machines, designed to embrace the widest field of application. Jackson & Bradwell electronic dynamic balancing machines are setting up new standards of speed and accuracy in dynamic balancing—write for details.

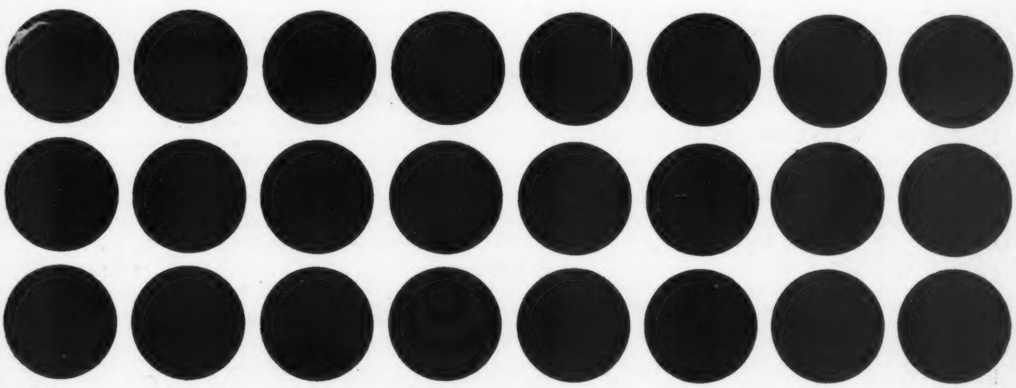
JACKSON & BRADWELL LIMITED., Grove House, Sutton New Road, Birmingham 23
Telephone: ERDington 7411/2 Telegrams: Expert Birmingham 23

BALANCING FOR THE TRADE

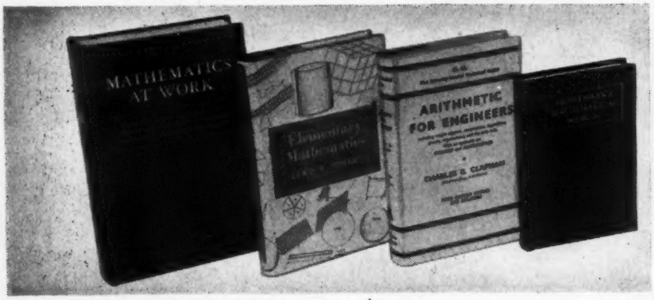
We can offer Balancing capacity on Jackson-Bradwell Balancing equipment for weights from 5lb. to 600lb. and lengths up to 5ft. All work is carried out promptly by experts at reasonable prices. Send us your enquiries.

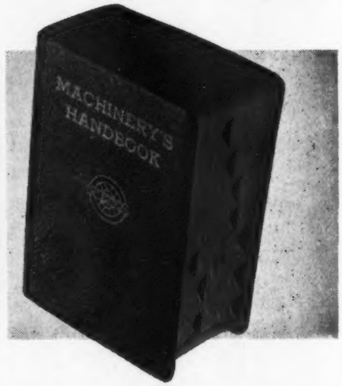
BALANCING & TECHNICAL SERVICES
GROVE HOUSE, SUTTON NEW ROAD, BIRMINGHAM, 23
Telephone Numbers: ERDington 7411/2





MACHINERY'S BOOKS ON . . . MATHEMATICS AND MECHANICS





MACHINERY'S HANDBOOK
—E. Oberg and F. D. Jones

The 16th Edition of this world-famous book has been revised and enlarged to 2,104 pages. Completely up-to-date, it is the finest reference work obtainable for *ALL* those engaged in the metal-working industries. Covers the entire field of workshop practice. Whether your interest is engineering, design, or production, you should have the latest facts, formulae and dimensional data at hand for ready reference. A reliable working Handbook that will answer your questions; provide ready solutions to your problems, and give you the information you need—when you need it. Bound and produced to give years of everyday use.

Price **88s.** cash and C.O.D. Instalments **96s.,** payable **16s.** in 10 days, **16s.** monthly. Overseas, cash with order, plus 3s. postage.

MATHEMATICS AT WORK
—Holbrook L. Horton

Describes the application of arithmetic, algebra, geometry, trigonometry and logarithms to the solution of mechanical problems, with formulae commonly used in engineering practice. Standard reference tables and a concise review of basic principles.

Price **60s.** cash and C.O.D. Instalments **66s.,** payable **11s.** in 10 days, **11s.** monthly. Overseas, cash with order, plus 3s. postage.

MACHINERY'S FIVE-FIGURE LOG BOOK

This book bridges the gap between four-figure logs and seven-figure logs. Considerably enlarged edition including logarithms of trigonometrical functions. 142 pages.

Price **5s. 6d.** cash and C.O.D. Instalments **6s.** Overseas, cash with order, plus 1s. 6d. postage.

MANUAL OF PRACTICAL MATHEMATICS
—Frank Castle

An introduction to the methods of higher mathematics. Covers trigonometrical equations, indices and logarithms, mensuration of solids, vectors, differentiation, successive differentiation and Taylor's and Maclaurin's theorums, integration, moment of inertia. Fourier's theorum and differential equations. 624 pages.

Price **16s.** cash and C.O.D. Instalments **17s. 6d.,** payable **5s. 6d.** in 10 days, **6s.** monthly. Overseas, cash with order, plus 2s. postage.

SHOP MATHEMATICS—E. Oberg and F. D. Jones

Dealing with machine-shop and tool-room problems and containing examples illustrating their solution and the application of rules and formulæ.

Price **36s.** each and C.O.D. Instalments **40s.,** payable **7s. 6d.** in10 days, **6s. 6d.** monthly. Overseas, cash with order, plus 2s. 6d. postage.

ARITHMETIC FOR ENGINEERS
—Charles B. Clapham

Revised edition of a well-established text. It covers: vulgar and decimal fractions; symbolic representation; simple equations; logarithms; mensuration; graphs; the slide-rule; and trigonometry.

Price **21s.** cash and C.O.D. Instalments **23s.,** payable **8s.** in 10 days, **7s. 6d.** monthly. Overseas, cash with order. plus 2s. 6d. postage.

ELEMENTARY MATHEMATICS—Lewis W. Phillips

A simple and interesting treatment of elementary mathematics, designed to help both student and those unable to attend classes. Covers preparatory ground work for National Certificate courses in various technical subjects.

Price **12s. 6d.** cash and C.O.D. Instalments **13s. 9d.,** payable **7s.** in 10 days, **6s. 9d.** one month later. Overseas, cash with order, plus 2s. 6d. postage.

FREE APPROVAL **NO DEPOSIT** **INSTALMENTS**

To MACHINERY, National House, 21, West Street, Brighton 1, Sussex.
Please send me the Books marked X. For CASH herewith or by C.O.D. or ON APPROVAL when I will return in 5 days or pay FULL CASH, or by INSTALMENTS, as stated above.

NAME .... *FIRM* ....

ADDRESS.. *POSITION* ....

....

Write for Book Catalogue and details of Instalment Terms. *free Examination Scheme applies to the U.K. and Eire only.*

Over 80 years experience in Gears

For over 80 years . . . G. W. EVERY & SONS LTD. have been fashioning small gears for all purposes.

Today, in our new factory at Bletchley, equipped with the most modern machinery, we are continuing to manufacture all types of gears up to 8in. diameter, and from 10 to 64 D.P. in any material to the complete satisfaction of our many clients throughout the U.K. and overseas.

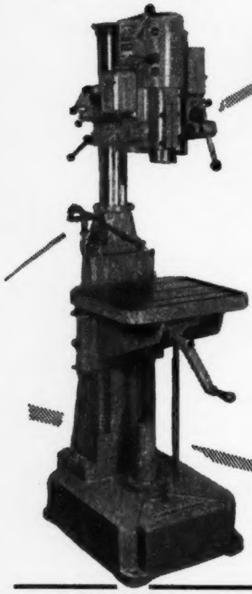
Any quantity delivered . . . anywhere! Your enquiries, by phone or letter, will be welcomed at our new factory, and will receive our prompt attention. Let us make YOU another satisfied Every client !

G. W. Every & Sons Ltd.

EVERY

FIRST AVENUE • DENBIGH ROAD • BLETCHLEY • BUCKS

Telephone: Bletchley 2476



GRIMSTON

High Speed DRILLING MACHINES

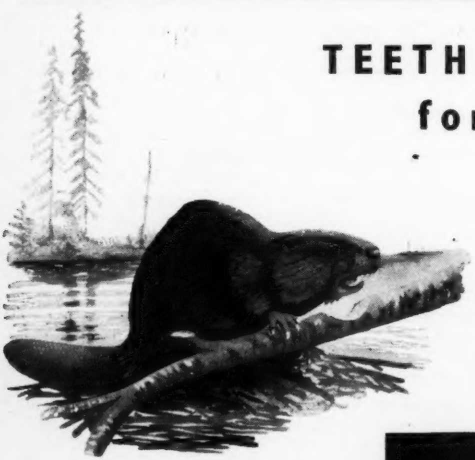
Designed for continuous heavy duty, these rigid, powerful and accurate box column machines are available with capacities up to $1\frac{1}{8}$in. diameter. Choice may be made from a range which includes 4, 8, 12 and 16 speeds, and power feeds can be specified if required. Also available with speeds as low as 7 r.p.m.

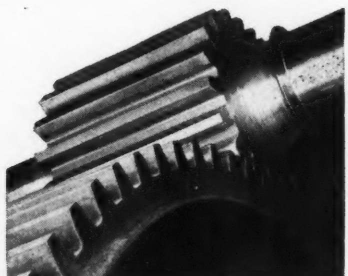
Ask for details, quoting Ref. M15.

GRIMSTON ELECTRIC TOOLS LTD., PROGRESS WAY, CROYDON, SURREY

PHONE: CROYDON 0131 GRAMS: GRIMTOOL, CROYDON

TEETH for the JOB





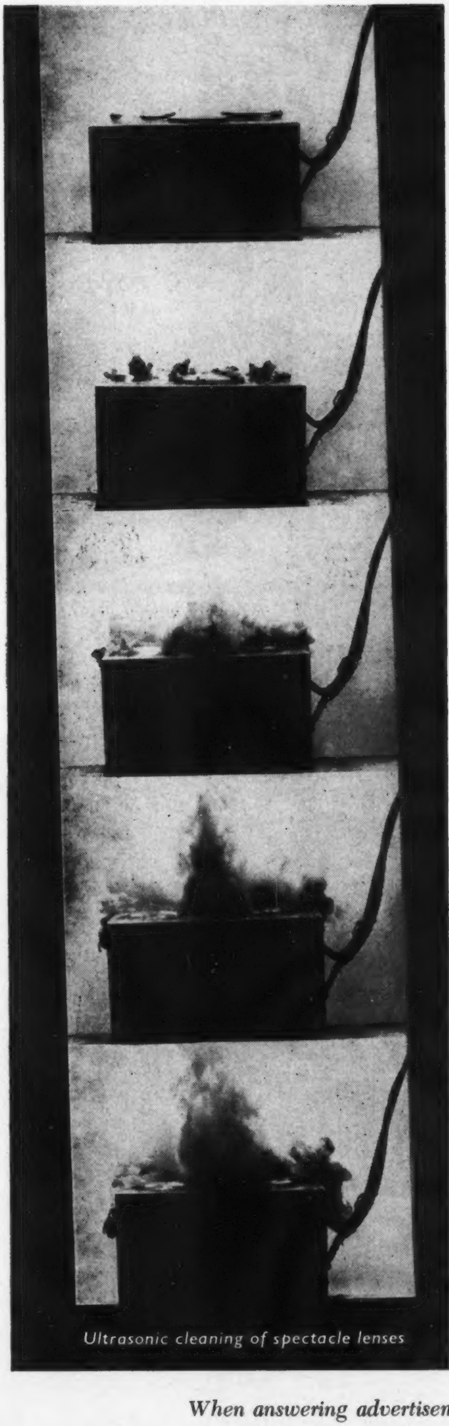
Aurora produce gears with teeth specifically designed to your requirements, spiral gears, worm gears, helical and double helical, bevel gears and spur gears.

AURORA
GEARS

AURORA GEARING CO. (WILMOT NORTH) **LTD. EDMUND RD., SHEFFIELD**

(A subsidiary of the Aurora Gear & Engineering Co. Ltd.)

Phone: Sheffield 24385-6-7 **Established 1880**



Ultrasonic cleaning of spectacle lenses

Ultrasonic Cleaning

cleans ultra-efficiently

HOW?

By introducing high frequency pressure waves in liquid cleaning media (alkaline or solvents), causing momentary tiny vacua, called cavitations. The effect is a mechanical scrubbing action on surfaces to be cleaned, removing all oily or solid contaminations like dirt, swarf or grease. The pressure waves are created by immersed nickel transducers, which oscillate at a frequency of 22 kilocycles, the source of which is a valve generator converting the mains current to high frequency current.

WHAT?

Ultrasonic cleaning is the most effective method of cleaning articles which are difficult to clean by ordinary methods. In particular, parts which are contaminated with solid soil, such as pieces of polishing cloth or polishing paste, swarf in fine holes, enclosed angles, ridges, ledges, hollows; parts with dirt deposits of long standing; parts having residues of hardening compound, etc.

WHERE?

Ultrasonic cleaning can be applied in any kind of conventional cleaning installation, such as alkaline cleaning tanks, Tri-degreasers, etc., by simply immersing the nickel transducers in the cleaning liquid. Special equipment entirely adapted to particular applications of Ultrasonic cleaning, either hand operated or fully automatic, can be supplied.

FURTHER QUESTIONS . . . concerning Ultrasonic Cleaning, its capabilities and characteristics, are answered in our special leaflet. Please write for a copy.

From Roto-Finish come these other surface treatments:

Barrelling and Vibrafinishing for metal and plastics to deburr, descale, deflash, radius, surface blend, polish or lustre.
Atram phosphating processes.
Electropolishing.
Ultrasonic cleaning.
Mechanical cleaning.
Grisiron Alkaline cleaners.
Euron cleaner passivator.
Conversion and protective coatings.

Tell you more about any or all of them? We would be happy to if you write or telephone us.

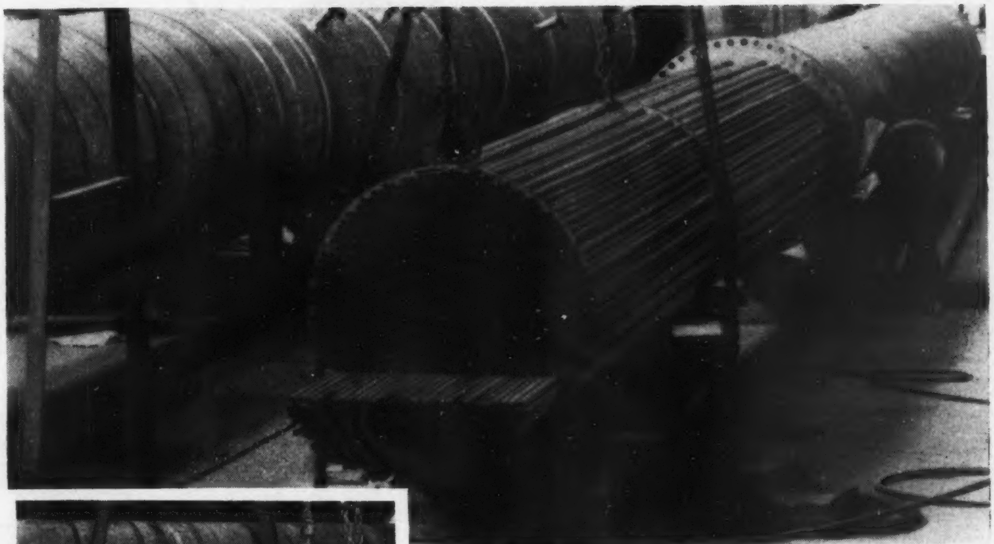
Rely on

Roto-Finish

to provide the finishing touch

Mark Road, Hemel Hempstead, Herts.
Boxmoor 4600 (PBX)

For Holland:
N.V. Roto-Finish Mij., Rotterdamseweg 370A, Delft, Holland



A condenser manufactured by The A.P.V. Company Limited, Crawley, Sussex. The complete installation incorporated 47,000 feet of PERMBRITE *welded stainless steel tube.*

THIS IS WELDED TUBE

Are YOU using welded tube economy?

Today in countless uses welded stainless steel tube is specified in preference to solid seamless tube. It is also considerably cheaper. That's why more and more progressive industries are using PERMBRITE tube. They know that, with today's enormous progress in welding techniques, this tube is not only equal to 'solid seamless' in strength—but is generally more consistent and uniform in wall thickness, with no inclusions. Are *you* up-to-date with welded tube economy?

STRENGTH

Exhaustive tests and extensive use have proved the 'weld is as strong as the wall'—and as resistant to corrosion.

VERSATILITY

Welded tube can be used for heat exchangers, corrosive plant, high pressure uses, chemical piping—all those exacting uses which once demanded 'solid seamless.'

UNIFORMITY

Because the tube is made from precision steel strip—you can depend on a uniform thickness of wall in welded tube.

HIGH PRESSURES

Welded tube can withstand working pressures of from 1,000 to 5,000 p.s.i. depending on size.

SPEED OF DELIVERY

Your needs in welded tube can be met from stock in many cases, or made to order quickly.

Permbrite welded stainless steel tubes are made in a range from $\frac{3}{8}$ in. o.d. to $2\frac{1}{2}$ in. o.d. in wall thicknesses 26G to 12G. These tubes are made from austenitic stainless steel to international specifications.

REGD.

Permbrite

STAINLESS STEEL TUBING

Write for details to:-

Rollo-Hardy & Co Ltd

Sales and Administration:
Paddockhall Rd, Haywards Heath, Sussex
Tel: Haywards Heath 1831 (5 lines)

FACTORY: BLAERNHONDDA, GLAM

(A member of the Compoflex group of Companies)

WESTWOOD
ROLLER BURNISHING TOOL

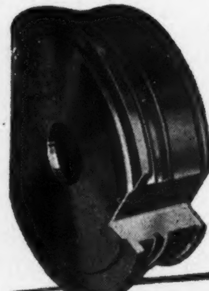
for improved finish at Lower Cost

- ★ SELF-FEEDING AND AUTOMATIC RELEASE
- ★ WIDE RANGE OF ADJUSTMENT AND MICROMETER SETTING TO 0·0001in.
- ★ SURFACE FINISHES OF 3-MICRO INCHES . . . AND BETTER . . . EASILY OBTAINED
- ★ CUTS OUT EXPENSIVE LAPPING AND HONING
- ★ GIVES IMPROVED WEAR RESISTANCE BY WORK HARDENING WORK SURFACE
- ★ FINISHES AT ONE PASS OF THE BURNISHER

Full range of sizes for bores of 0.218 ins. upwards

WRITE FOR COMPLETE DETAILS . . . .

WESTWOOD
MACHINE TOOLS CO. LTD.
77A HIGH ST., CAMBERLEY, SURREY
TEL: CAMBERLEY 21431



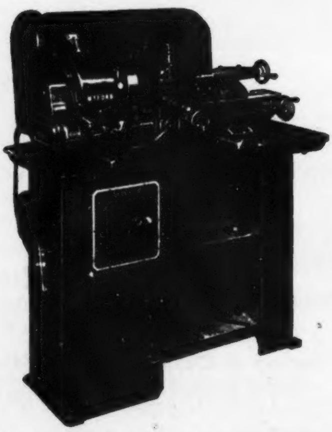
* PROFILE GROUND
FORM TOOLS
. . . in High Speed Steel and Carbide Tipped

for Automatics...

We design and manufacture complete tooling for all turret type and swiss-type automatic screw machines. Cam blanks supplied ex-stock. Cams machined to customers drawings.

MOSER CAMS & TOOLS LTD.
465, HORNSEY ROAD, LONDON, N.19
Telephone: ARCHWAY 1766 & 7017

BUCK & RYAN LTD.
— TOOL MERCHANTS —
Established 1824
310-312 EUSTON ROAD, LONDON, N.W.1
Tel: EUS 4661 And at 261 EDGWARE RD. LONDON, W.2



MYFORD 3½ SUPER 7B LATHE ON INDUSTRIAL STAND WITH SUDS EQUIPMENT

We are Myford Specialists and have good stocks of Accessories for Immediate Delivery.
Leaflets and Quotations on Request.

HOW IMPORTANT IS

SURFACE FINISH CONTROL?

Are your Draughtsmen, Foremen, Inspectors and Machinists surface finish conscious? If so, your products will have a high reputation; if not your products will not be classed as high quality.

"RUBERT" Surface Roughness Scales provide a reference of calibrated Surface Roughness for comparison of machined surfaces by sight and touch, and fulfil the need for a simple, dependable standard for visualising, selecting, and specifying surface conditions for production work.

Whether your have electronic instruments to test Surface Roughness or not, your Draughtsman always needs Surface Roughness Standards to enable him to specify the required surface finish, and the Machinist cannot be without these because he must always have a comparison handy to tell him whether the finish is good enough, not good enough, or too good.

We supply complete sets and single standards for special requirements to B.S.S. 1134: 1950, and B.S.S. 2634/1: 1955 Accuracies 10% or 20%

RUBERT

SURFACE ROUGHNESS SCALES

Used by hundreds of the most promin nt British Firm

RUBERT & CO. LTD. Acru Works, Demmings Rd. Councillor Lane, Cheadle, Cheshire

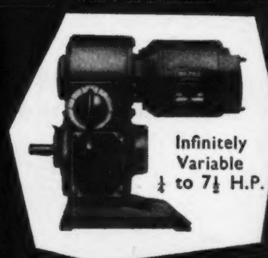
Telephone: GATley 5855

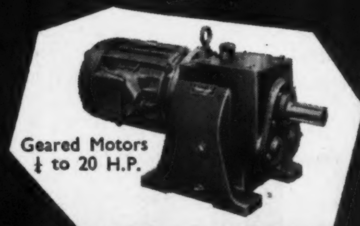
PERFECT PRESSINGS RESULT WHEN USING

The universal drawing device for any size and make of press

WORSON DIE CUSHIONS LTD.
RABONE LANE WORKS · SMETHWICK · STAFFS.

RAYNER POWER DRIVES



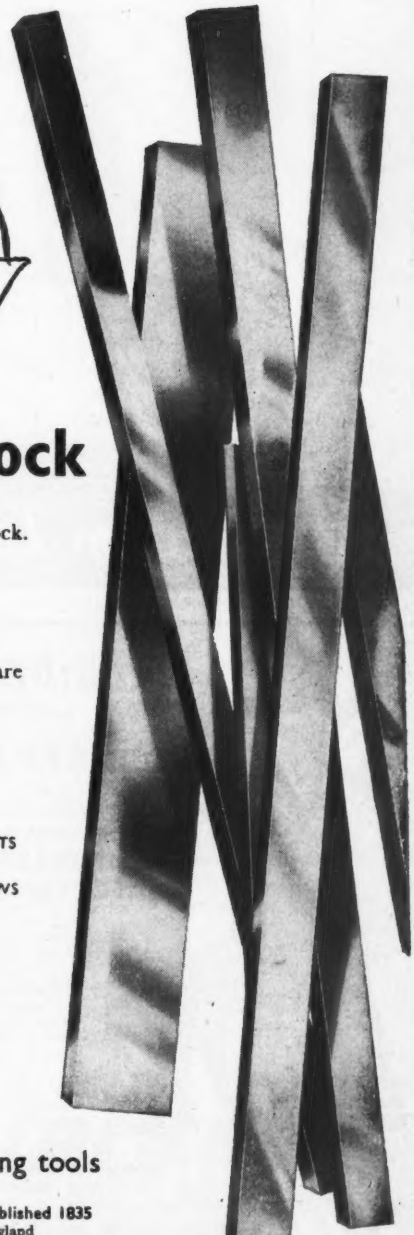


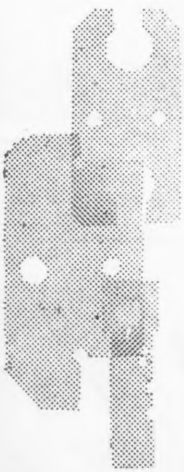
COMPACT PURPOSE-MADE POWER DRIVES ARE OUR BUSINESS

PETER RAYNER LTD RAYNER

121 WHITEHALL RD · LEEDS 12 TELEPHONE: LEEDS 33864/5

FOR A MULTITUDE OF PURPOSES

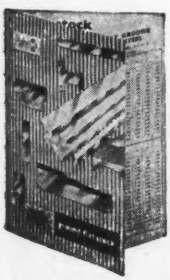




ground flat stock

This isn't just ordinary ground flat stock. To start with, it's "Wardson" carbon chrome alloy steel, oil hardening, non-distorting. Then it's precision-ground to .001 limits on 1/32" to 2" thickness, and cut to 18" and other lengths. Widths are from ¼" to 12" which provide the perfect basis for gauges, templates, jigs, tools, machine parts, etc. Special sizes to order.

ROTARY CUTTERS · MACHINE KNIVES
METAL SLITTING SAWS · TOOL BITS
REAMERS · GROUND FLAT STOCK
MILLING CUTTERS · SCREW SLOTTING SAWS



Wardson

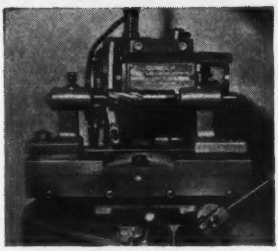
a famous **Sheffield** name for cutting tools

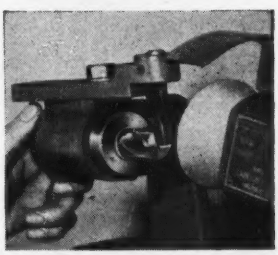
Wm. WARD & SON (SHEFFIELD) LTD. Established 1835
Centenary Works, Woodseats Road, Sheffield 8, England
Telephone: 52451 (2 lines). *Telegrams:* "Wardson, Sheffield 8"
Registered Trade Marks: "Wardson" · "Rubicon"

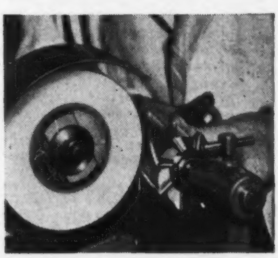
Who knows more about

CUTTER GRINDING

than cutter manufacturers?







Ideal for resharpening End Mills, Slot Drills, Woodruff cutters, T-slot cutters, Counterbores, Countersinks, Side and Face cutters, Cylindrical cutters, Face mills, Angle cutters and many other types.

The men who make cutters know the best methods of keeping them in good condition. That's logical. Clarkson make the finest cutters and offer to Industry their own design of Cutter Grinder which is used exclusively in their works.

The Clarkson Cutter Grinder is front operated for maximum visibility. A built-in, adjustable lighting unit allows the operator to obtain concentrated, glareless light on any part of his work at any time.

The machine can be set and the cutters resharpened in 15 to 20 minutes, according to type. It is compact enough to be installed in any convenient corner of your works.

Speed, efficiency and ease of installation—what more do you need? A 'phone call or letter to your nearest Clarkson centre will bring you a fully descriptive leaflet on this versatile, yet reasonably priced Cutter Grinder.

Clarkson

CLARKSON (ENGINEERS) LTD.
KING EDWARD ROAD
NUNEATON WARWICKSHIRE

also LONDON, BIRMINGHAM, MANCHESTER, GLASGOW, BRISTOL, LEEDS, NEWCASTLE, BELFAST and COVENTRY.

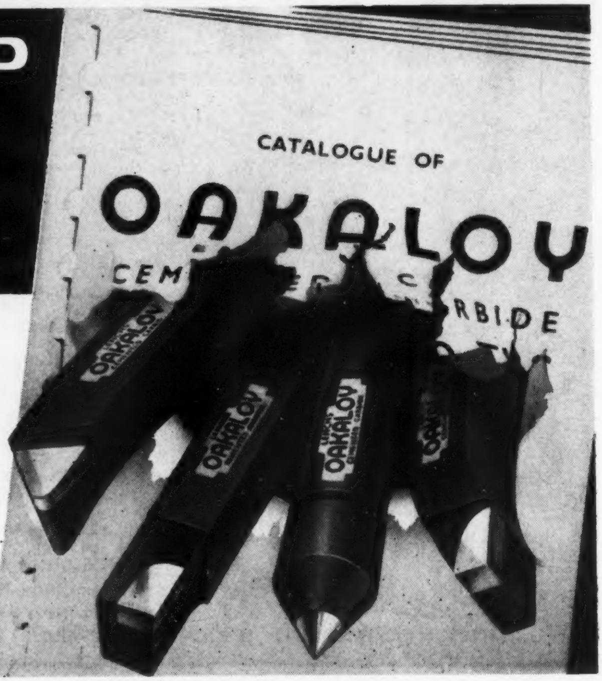
STANDARD

OAKALOY

TUNGSTEN CARBIDE TIPPED

TOOLS

—for longer life



The comprehensive range of OAKALOY Tungsten Carbide Tipped STANDARD tools includes Turning, Boring, Facing, Recessing, Parting, Planing, Forming tools, etc. .... IN FACT STANDARD TOOLS TO MEET EVERY REQUIREMENT ...

COMPLETE TECHNICAL SERVICE AT YOUR SERVICE

LENCHS

(B'HAM LTD.)

BARR STREET, BIRMINGHAM 19

Telephone: NORthern 8421 (4 lines)

PROMPT DELIVERY

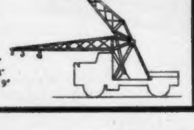
KWIKLIFT

HYDRAULIC MOBILE CRANE

designed for low operating costs and easy maintenance

.... QUICK WORK too! The low capacity, high performance Kwiklift can travel at 30 m.p.h. as against the conventional 2-12. Maintenance consists of normal vehicle service, with little or no attention required by the crane unit itself. Write for a brochure, which gives you all the remarkable features of Kwiklift.

Single ram operated jib, with 3 swivel hooks to lift
1 ton at 21' 7"
2 tons at 19' 8"
2½ tons at 17' 9"



THE LOWEST PRICED CRANE IN THE WORLD

COHEN BROS.
(Electrical) Limited

Crane Division, Dept. A.,
11, King Edward Buildings,
Bury Old Road,
Manchester, 8.

Grinding and Polishing consult

UNIPOL

ABRASIVE BAND POLISHER

Universal application for deburring, grinding or polishing small components; Band can be set in vertical or horizontal position. PRICES FROM £65

R. J. H. TOOL & EQUIPMENT CO. LTD.

HECKMONDWIKE, YORKS.
Tel: Heckmondwike 490

When answering advertisements kindly mention MACHINERY.

Presswork and Springs of every type

IN ALL METALS TO THE FINEST LIMITS
SPECIALISTS IN BERYLLIUM COPPER
PROGRESSIVE PRESS TOOLS
MULTI SLIDE AND TRANSFER PRESSES
HIGH PRODUCTION DEEP DRAWING

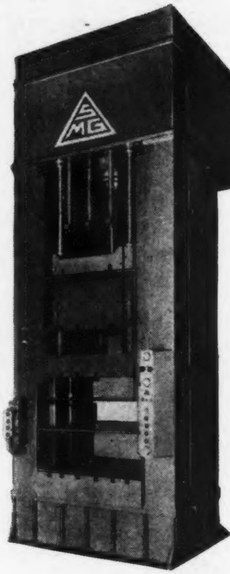
Electro (Spark) Erosion for the Trade

Helical Tension, Torsion and Compression Springs and Wire Shapes from 40 S.W.G. (0·0048in.) to $\frac{3}{16}$in. dia. Wire

FULLY A.I.D. AND A.R.B. APPROVED

SPRING STEEL PRODUCTIONS LTD

Factories: 784-788 HIGH ROAD, TOTTENHAM LONDON, N.17 • TEL: TOTTENHAM 7745/7 and COMMERCE TRADING ESTATE, RAVEN ROAD, SOUTH WOODFORD, E.18



FOR IMMEDIATE DELIVERY

SMG

Treble acting Hydraulic Drawing Press

Maximum total pressure 140 tons

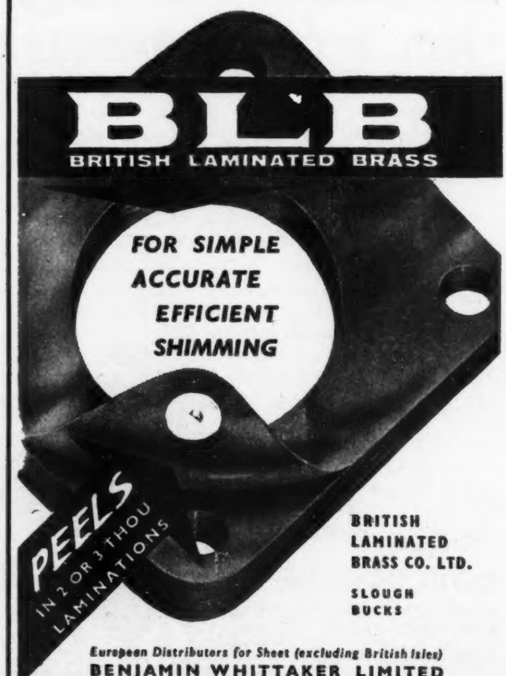
Size of table 39in. by 33in.

Maximum depth of draw 8in.

PEARSON PANKE LTD

1-3 Hale Grove Gardens, London, N.W.7
Telephone: Mill Hill 3232. Telex: 23273

NRP5104



BRITISH LAMINATED BRASS CO. LTD.

SLOUGH BUCKS

European Distributors for Sheet (excluding British Isles)
BENJAMIN WHITTAKER LIMITED
VICTORIA HOUSE, VERNON PLACE, SOUTHAMPTON ROW, LONDON W.C.1.

ALL ENGINEERS NEED SHIM STEEL

For experimental work of every type, on-the-spot alterations and individual constructions. It's the quickest to use easiest to handle steel supplied in convenient sizes and numerous thicknesses.

KEEP A PACKET OF EACH THICKNESS HANDY

Packages contain twelve 24in. by 6in. sheets; 6in. coils of any length also available.

THICKNESS	TOLERANCE
0·001in., 0·0015in., 0·002in., 0·003in., 0·004in.	± 0·0002in.
0·005in., 0·006in.	± 0·0003in.
0·007in., 0·008in., 0·010in., 0·012in.	± 0·0004in.
0·015in., 0·020in., 0·025in.	Proportionate

SHIM WASHERS MADE TO ORDER

ORDER YOUR BRIGHT, COLD ROLLED SHIM STEEL FROM STOCK:

J & H SMITH LTD

CORNER HOUSE, WHITEHALL ROAD, LEEDS 12 · Tel.: 21561

SCOTTISH AVIATION

for...

DESIGN AND MANUFACTURE OF AIRCRAFT COMPONENTS

DESIGN AND MANUFACTURE OF JIGS AND TOOLS

DESIGN AND MANUFACTURE OF GLASS FIBRE COMPONENTS

SHEET METAL FABRICATION IN LIGHT ALLOY OR STEEL

PROTECTIVE TREATMENT, STOVE ENAMELLING

ALL TYPES OF MACHINE SHOP WORK

Send your enquiries to:-

SCOTTISH AVIATION

PRESTWICK AIRPORT · AYRSHIRE

'PHONE: PRESTWICK 79888 (20 lines)
TELEX: 77432
CABLES: AERONAUTICS PRESTWICK

for sharp... very exact... reproduction

Dania *finest quality*

DRAWING INK

Laboratory tested and proved one of the finest inks in the world. Microscopically superior, DANIA Drawing Ink has an excellent flowing capacity and remains workable in the drawing pen for over seven minutes of constant work. It makes it possible to work with very thin lines and yet has excellent covering ability. Draughtsmen and Commercial Artists prefer it for its depth of colour which ensures perfect reproduction. It can be diluted with distilled water to all shades.

In black and 16 colours.
1½ oz. (NOT 1 oz.) screwtop pipette bottles. 2/6.
Plastic Cartridges 0.46 oz. (can be refilled). 1/9.
Also available in ¼ litre (approx. 9 oz.) and ½ litre (approx. 18 oz.) bottles.
Send P.O. 2/6 for Trial Bottle to Dept. M.

B. CHARLES ROFF & CO. LTD.,
38a PARADISE STREET, BIRMINGHAM 1
Tel: MID 3517-8
Also at 1 MANVERS STREET, BATH *Tel: BATH 2858*

WHEEL FORMING DIAMONDS

S.L

VAN MOPPES

DIAMOND TOOL SPECIALISTS

Thread grinding tools, Wheel forming tools a speciality

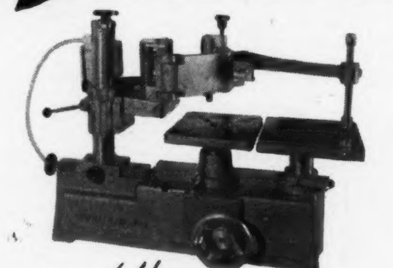
Shaped diamond tools for turning and boring

If you are experiencing trouble with your form grinding, we shall be pleased to place at your disposal qualified Technical Staff who will endeavour to give you every assistance. We specialise in chisel shaped tools for profile grinding.

S.L. VAN MOPPES LTD.
HEAD OFFICE: **ST. ANDREWS HOUSE**
32/34 HOLBORN VIADUCT, LONDON, E.C.1
TEL: FLEET ST. 2731-2

---

for 3D *Engraving*



You need the

David Dowling

MODEL 242 Compact — Sturdy — Large capacity — for fine engraving, mould and die work. Pantographs range from 2:1 8:1

For full details write:
DAVID DOWLING LTD., Bates Road, Harold Wood, Romford
Telephone Ingrebourne 43904/5

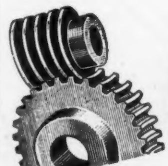
"TURNCO"

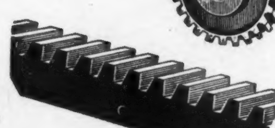
REGD TRADE MARK

GEAR SERVICE

FOUNDED 1919

REPLACEMENTS FOR INDUSTRY A SPECIALITY





G. H. TURNER & CO. LTD.

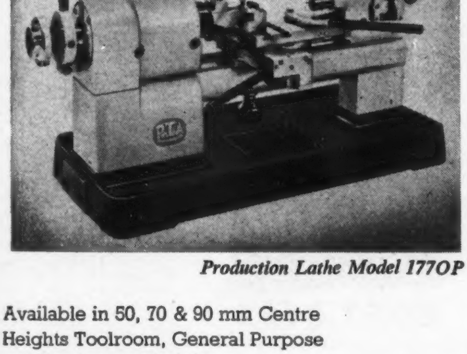
Bell Street, Wolverhampton 'Phone 20852/3/4

Thread Chasing Lathe Model 159OJ

accurate and
fine limits on.....

PULTRA micro lathes

MANUFACTURED BY
SMART & BROWN (MACHINE TOOLS) LIMITED



Production Lathe Model 177OP

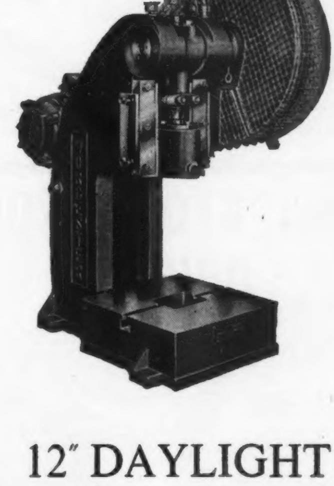
Available in 50, 70 & 90 mm Centre Heights Toolroom, General Purpose and Production Models.

All machines can be furnished with cut-off and Capstan Slides. Lathes can be equipped to your requirements from standard units.

PULTRA LIMITED
25 MANCHESTER SQUARE · LONDON · W.1.
Telephone WELbeck 7941-5 Cables Smartool, Wesdo, London
Member of the GAS PURIFICATION AND CHEMICAL GROUP OF COMPANIES

NEW

WORCESTER 6 TON LARGE DAYLIGHT DEEP THROAT BENCH POWER PRESS



12" DAYLIGHT
7" THROAT DEPTH

ALSO STANDARD 6,3 & 2 TON MODELS

Send for Catalogue & Price List to:—

JONES & ATTWOOD LTD.
Dept.—W1
STOURBRIDGE WORCESTERSHIRE

Telegrams: HEAT, Stourbridge *Telephones: Stourbridge 5106-7-8*

CLASSIFIED ADVERTISEMENTS

RATES: PLAIN ADVERTISEMENTS Except "Situations Wanted" (ALL TYPE): 2/2 per line. MINIMUM 8/8 (4 lines) OR £1 8s. 2d. per inch (13 lines per inch). *Box Nos. 1/3 extra per insertion.* SITUATIONS WANTED: 1/8 per line. MINIMUM 6/8 plus 1/3 *Box No.* SPECIAL DISPLAY TYPE (with or without Blocks): £2.0.0 per single column inch and pro rata. *Series rates on request.* Advertisements in the "Classified" section can be accepted, space permitting, at the London office, up to Wednesday night for publication on the following Wednesday.

CONTRACT WORK

••• DESIGNS •••

NOW!! SPARK EROSION TO THE TRADE
On Precision Swiss Eleroda Machine
Reduce Press Tool costs
CARBIDE—FORGING—EXTRUSION
IMPACT EXTRUSION DIES
We also modify existing tools

PRESS TOOLS
LAMINATIONS—COMBINATION—PROGRESSION, ETC.
JIGS—FIXTURES
PROTOTYPE MACHINING
Designing—Short Order Work—Sub Assemblies Completely Tooled
JIG BORING AND PRECISION GRINDING
LANDEN (ENGINEERS) LTD.
1a, Aubert Park, Highbury, London, N.5
Phone: CANonbury 1075

PRECISION PRODUCTS (ROMFORD) LTD.
TOOL DESIGNERS AND MANUFACTURERS
For all your needs
IN
JIGS · FIXTURES · GAUGES
PRESS TOOLS · FORM TOOLS
AND SPECIAL MACHINES
A.I.D. Approved
Viking Works, London Rd., Romford, Essex. Tel: Romford 61991/2

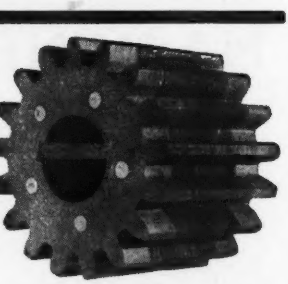
Tool Design, Moulds, Jigs and Fixtures, etc. Quotations given.—S. METCALF & CO., Oaklea Mills, Oakleys Road, Long Eaton, Nottingham. Tel.: Long Eaton 4657.

Machine Tool Design, Research and Development. Old established firm of Machine Tool Engineers, having a small drawing office specialising in the design of modern machine tools, special machine tools, special machines for machine tool research, etc., could undertake a certain amount of work of a similar nature, provided that there would be no conflict with existing obligations. Enquiries, which will be regarded as strictly confidential, are invited.—BOX C529, MACHINERY, Clifton House, Euston Road, N.W.1.

••• GEARS •••

Have you a Gear problem?

Our patented **Geolite** Silent gears have, by achieving a 33⅓% strength increase over all other types, opened a wide range of new applications for non-metallic gears.



Maybe we can help you!

Write for particulars:

MacECHERN & COMPANY LIMITED
HIGH STREET, CHISLEHURST, KENT. . . Telephone: IMPerial 1103

RACKS & PINIONS

CUT FROM 4 D.P. TO 50 D.P.
EAGLE MILLING Co. Ltd.
114-116, Lancefield Street, LONDON, W.10
Telephone: LADbroke 0725 and 1294

● ***ENGINEERING BUYERS NEED MACHINERY'S ANNUAL BUYERS' GUIDE***

MOULDS FOR PLASTICS
PRESSURE DIECASTING DIES

H J & C S

For the best tools, designs and service

J. H. CARPENTER & SONS (LONDON) LTD
107a YORK WAY, LONDON N.7 TEL. GULLIVER 3917

GEARS—PRECISION AND INSTRUMENT MACHINE CUT
Max. capacity 12 D.P. 8in. dia.
Blanks turned and cut.
SETON CREAGHE ENGINEERING LTD.,
TRADING ESTATE, PARK ROYAL ROAD, N.W10
A.I.D. 'Phone: ELGar 3356/7 A.R.B.

GENERAL ENG'G. •• SERVICES ••

Plough Grinding—Plate and Components—Ground Blanks supplied.—BRUNSWICK ENG. CO., 120, Ewell Road, Surbiton, Surrey. ELMbridge 5872.

Stonebridge **PLOUGHGRINDING** Service 707 Tudor Estate, Abbey Road, Park Royal, London, N.W.10. ELG. 5353. GROUND BLANKS SUPPLIED.

F. W. POTTER & SOAR LTD
PHIPP STREET, LONDON E.C.2
Telephone: Shoreditch 9582

WIREWORK
WOVEN WIRE
SHEET METAL WORK
MACHINING
LIGHT IRONWORK
MACHINERY GUARDS

Immediate Capacity Available castings, non-ferrous, die, shell moulded, sand, etc. Also machining and stove enamelling.—MILLS ENGINEERING PRODUCTS. LTD., Barnet. 'Phone Barnet 6744.

Luton Engineering Pattern Co. are prepared to undertake the manufacture of all classes of wood and metal patterns, and accuracy and prompt delivery guaranteed.—Send your enquiries to 89A Princes Street, Luton. 'Phone: 961.

PLOUGH GRINDING 60 x 18 x 12
LARGE TURNING 60in. Dia.
HORIZONTAL BORING
ALAN KEIR LTD.,
NORTH ACTON ROAD, LONDON, N.W.10. ELG 2612

INDUCTION HARDENING AND BRAZING
CYANIDE HARDENING, PACK CARBURISING
Shot-blasting
PRECISION HEATING LTD.
Island Farm Avenue, West Molesey, Surrey
Phone: MOLesey 4231

PROTOTYPES & SPECIAL PURPOSE MACHINES
REPAIRS AND SALVAGE BY DEPOSITION
MACHINING, FORGING & FABRICATING
GEORGE MILLS (ENGINEERS) LTD.
Beckenham, Kent. Tel.: Sydenham 5255

ABBEY **HEAT TREATMENTS** LTD.
PLAZA WORKS, HIGH STREET, MERTON, S.W.19
FOR ALL TYPES OF HEAT TREATMENT
A.I.D. WE COLLECT - WE DELIVER D.I.
A.R.E. TELEPHONE: CHErrywood 2291 Arm.

GAUGES (*Not Thread*)—JIGS—FIXTURES, etc,
EXPERIMENTAL & PROTOTYPE WORK, A.I.D. Apd.
NOVOGAGE LTD.
(For quality and precision)
JIG-BORING, JIG-GRINDING, TOOL ROOM MACHINING
81, Bridge Road, (Nr. HAMPTON COURT STN.) *Tel.: MOLESEY 2763 and 4102* East Molesey, Surrey.

GENERAL HEAT TREATMENT
CASE HARDENING AND CYANIDE HARDENING ON PRODUCTION BASIS OR SINGLY
SHOT BLASTING
A.I.D. APPROVED

•
CROYDON TOOL AND CASE HARDENING SPECIALISTS LIMITED
UNION ROAD · WEST CROYDON
Tel: THORNTON HEATH 5222

Harvey-Hood

Prototype and production quantities of precision mechanical and electrical engineering to customers' design and requirements

SEND US YOUR ENQUIRIES

HARVEY-HOOD ENGINEERING CO · LTD

CONTRACTORS TO THE ADMIRALTY

63a KINGSTON ROAD · WIMBLEDON · LONDON · S.W.19

TELEPHONE: LIBERTY 4235-6

CASTINGS

ECLIPSE FOUNDRY

& ENGINEERING CO. (DUDLEY) LTD.
SEDGLEY ROAD WEST
TIPTON ● STAFFS.

GREY IRON	ALUMINIUM	NON-FERROUS	MAZAK
Jobbing Casting up to one ton	*Sand & Die Castings*	*Gunmetals Phosphor-Bronze*	*Pressure Castings*

Repetition Machine Moulded Work

FOR :- MOLESEY 2216/7/8

A.I.D. **HEAT-TREATMENT** A.R.B.

J. M. HARGREAVE & CO. LTD., CENTRAL AVE., W. MOLESEY, SURREY

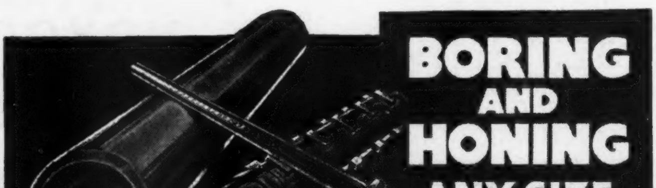
A.I.D. and A.R.B. Approved

IDEAL

HARDENING CO., LTD.
DAVIS ROAD, CHESSINGTON, SURREY

HEAT TREATMENT SPECIALISTS
HARDENING OF EVERY DESCRIPTION
AND SANDBLASTING

Tel.: ELMBRIDGE 6556



BORED & HONED TO MIRROR FINISH

British, specialists in boring and honing of hydraulic or air power cylinders, is your dependable source We work in any material to your specifications. Write or phone us for estimates.

MICROFINISH·LTD

EXETER PARADE : LONDON, N.W.2

Grams: MICROFINIS.
Phone: GLAdstone 1353

When answering advertisements kindly mention MACHINERY.

Classified Advertisements (*CONTRACT WORK, contd.*)

Plough Grinding

ANY QUANTITY · MAXIMUM SIZES 60" x 18" RECIPROCATING TABLE
48" DIAMETER ROUND TABLE · HIGH SPEED SERVICE TOOL COMPANY LIMITED
MAPLE ROAD SURBITON SURREY TELEPHONE ELMBRIDGE 1135-6-7

24 HOUR SERVICE

A.I.D. **THE** ELGar 5057/8
HEAT TREATMENT
PEOPLE OF LONDON
G.R.M. Heat Treatments Ltd., Coronation Rd., Park Royal, N.W.10

MACHINING
W. G. MARSDEN ENG. LTD
CAPSTANS TURRET LATHES AUTOS
LATHES MILLS DRILLS GRINDERS
COMPONENTS & ASSEMBLY PRODUCTION
FULL MACHINE SHOP SERVICE
JIGS TOOLS GAUGES PRESS TOOLS
30 FIFE ROAD - KINGSTON - ON - THAMES
KINGSTON 6112
CAPACITY

HIGH FREQUENCY
HEAT TREATMENT CO.
INDUCTION HARDENING, BRAZING & SOLDERING
926, NORTH CIRCULAR RD., LONDON, N.W.2 Tel.: GLAdstone 2542

All Kinds of Firms Send All Sorts of Machining to TIMS ENG. CO., LTD., Horizontal boring Centre Lathe, capstan and combination turret turning. Vertical and horizontal milling. Grinding. Jigs, tools, fixtures, moulds. Welding. Fabrications. Special machines. 1 off to batch production.—50, Bard Road, Latimer Road, W.10. LAD. 7711.

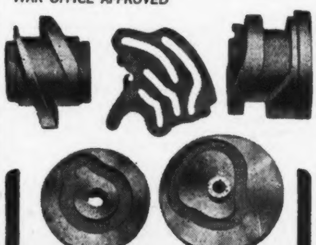
PROTOTYPE & PRODUCTION
ELECTRONIC WIRING, COIL WINDING, INSTRUMENTATION & TESTING
SETON CREAGHE ENGINEERING LTD.,
G. W. Trading Estate, Park Royal Road, N.W.10.
A.I.D. ELGAR 3356/7 A.R.B.

• • MACHINING • •

AUTO TURNED PARTS
FINE TOLERANCES, MAX. DIA. 1⅛in.
INDEX SS & GRIDLEY MULTI AUTOS
THREAD CHASING MANUFACT'RS
ROLLER BOX TOOL HOLDERS
BENTON ENGINEERING CO., LTD.
Tonbridge Road, Harold Hill, Essex.
Ingrebourne 43864/5.

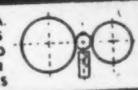
Immediate Capacity Available on Single Spindle Automatics up to 1¼in.—HARRADINE AUTOMATICS, Forge Works, Pleasant Place, Hersham, Surrey. 'Phone: W.-on-T. 24914.

DELANCEY
TOOL & ENGINEERING WORKS LTD.
A.I.D., ADMIRALTY & WAR OFFICE APPROVED



CAM CUTTING & GENERAL MACHINING
FITTING & EXPERIMENTAL WORK
PROMPT SERVICE
DELANCEY ST. LONDON, N.W.1
Telephone: GULLIVER 3448

CAPACITY FOR
CENTRELESS GRINDING...
0in. UP TO 3·50in. DIA. TO PRECISION LIMITS ON 'CINCINNATI' AND OTHER WELL KNOWN MAKES OF MACHINES



ALLEYNE FOSTER ENG Co. LTD
ESTABLISHED IN 1924
59 South St., Epsom, Surrey. Epsom 2190

Automatic Capacity Available up to ⅜in. dia.—HATFIELD AUTOMATICS, 26, Park Street, Hatfield, Herts. Tel.: Hatfield 2159.

FOR
THREAD MILLING
CONSULT
BROWN'S ENGINEERING WORKS
Dudden Hill Lane, N.W.10.
'Phone: GLAdstone 4921.

ASHTEAD ENGINEERING CO. LTD.
GROVE RD., ASHTEAD, SURREY
PHONE: ASHTEAD 802
FOR **THREAD MILLING** AND **CENTRELESS GRINDING**
ESTABLISHED 1920
A.I.D. & A.R.B. APPROVED

Classified Advertisements (*CONTRACT WORK, contd.*)

PRECISION TURNED PARTS
D.G.I. and A.R.B. APPROVED
AUTO & CAPSTAN QUANTITIES
Send your specification to:
AYLESBURY TURNED PARTS (True Screws) Limited
Britannia St., AYLESBURY, Bucks.
Telephone: AYLESBURY 2424 (3 lines)

Automatic and Capstan Capacity Available up to 2in. dia.—WILLIS ENGINEERING, 65, High Street, Hampton Hill, Middlesex. Molesey 4273.

Automatic Capacity Available on single spindle machines.—BARMAC ENGINEERING COMPANY, Bridge Works, Iver Lane, Cowley, Middlesex. Telephone Uxbridge 38839.

Planing Capacity, Heavy or Light Turning up to 5ft. diameter. Special machines to customers' design.
F. ATKINSON & SONS, (LONDON), LTD., 65, King's Cross Road, W.C.1. Terminus 4050

Capacity Turning, Capstan milling, drilling, die and tool making. —MILLS ENGINEERING PRODUCTS, LTD., Barnet. Tel.: BARnet 6744.

Automatic Capacity Available. Index single spindle Autos, up to 2¼in. diameter. Centreless Grinding Capacity ¼in. to 5in. diameter.
JAN PRECISION SCREWS, 629 Spur Road, Feltham, Middlesex. Telephone: Feltham 4282/3

Multi-spindle and Single-spindle Auto Turning up to 2in. bar capacity, capstan turning from the bar up to 2¼in. dia. chuck work up to 14in. dia., thread milling, milling, shaping, drilling, etc., capacity available. Any tolerance and quantity. Satisfaction absolutely guaranteed.—UNICORN PRODUCTS, LTD., 119-121, Stanstead Road, Forest Hill, S.E.23. 'Phone: FORest Hill 7688 (8 lines).

FINE LIMIT GRINDING
MILLING, TURNING, DRILLING.
Complete Service Offered.
SETON CREAGHE ENGINEERING LTD.,
Trading Estate, Park Royal Road, N.W.10
A.I.D. ELGar 3356/7 A.R.B.

Automatic Capacity Available, Index Autos, up to 2¼in. diameter. Chucking up to 5in.
JAMES HARRINGTON, Magda Works, Walton-on-Thames. Tel.: 26099 & 25614.

Capstan Capacity Immediately Available, 8 BA-1¼in. Steel or Brass. Large stocks of raw materials
SACRON, LTD., 7, Chiswick High Road, W.4. Tel. CHIswick 3595

High Precision Grinding of Tungsten Carbide and Steel Tools. Accurate profile grinding and progression tools a speciality.—S.T. LTD., 22-26, Upper Mulgrave Road, Cheam, Surrey. 'Phone Vigilant 0074/5.

Capstan Capacity Immediately available 16 BA to 1¼in. B.M.S. Stainless, Brass, etc. All materials in stock.—CHISWICK ENG., LTD. Pluckington Place, Southall, Middlesex. Tel. Southall 2247.

CENTRELESS GRINDING SPECIALISTS
BAR GRINDING
1/16in. TO 5in. DIA. UP TO 15ft. LONG
all types of infeed, through and plunge
A.I.D. APPROVED
IMMEDIATE CAPACITY ON CAPSTAN, MILLING CENTRE LATHES, AUTO AND ALL TYPES OF GRINDING
REDCAR ENGINEERING CO. LTD. *Tel* POPESGROVE 6157 & 7088
8 STATION YARD GROSVENOR RD TWICKENHAM MIDDX

AIRCRAFT UNIT ENGINEERING CO.
A.I.D., A.R.B. & A.R.B. LIMITED DESIGN APPROVAL
HAVE GRINDING CAPACITY
UNIVERSAL, PLAIN, CYLINDRICAL 86in. by 15in. dia.
CENTRELESS
18-19, Greenhill Parade, Great North Road, New Barnet, Herts.
Telephone: BARnet 6471 & 7499

EST 1890 **CHATER-LEA** MFG. Co. Ltd.
INVITE ENQUIRIES FOR BROACHING, THREAD ROLLING AND CENTRELESS GRINDING. WE REGRET THAT WE HAVE NO CAPACITY AVAILABLE AT THE MOMENT FOR OTHER TYPES OF MACHINING.
NEW ICKNIELD WAY, LETCHWORTH, HERTS.
R.B.A.A.I.D. I.F.V. APPROVED TEL: LETCHWORTH 490

Gear Cutting, Auto Turret, Capstan and Centre Lathe Turning, Milling, Planing, Hardening and Grinding, Profile Cutting and Welding.
SMITH & NETHERWOOD, LTD.
Tanyard Road, Quarmby, HUDDERSFIELD.
Phone: MILNSBRIDGE 1865.

WE MAKE TANKS, FRAMES, DUCTS, INSTRUMENT PANELS AND CHIMNEYS
Let us have your enquiries for welded fabrications large or small. And we can press 200 Tons, guillotine bend and cylindrical roll ½in. plate.
SHELMERDINE & MULLEY LIMITED
EDGWARE ROAD, CRICKLEWOOD N.W.2.
Tel: GLAdstone 7677-8.

E. R. LATTIMER LTD AID & ARB APPROVED
Offer complete Service for
PRECISION PROFILE MILLING, JIG BORING
CENTRELESS, SURFACE AND UNIVERSAL GRINDING
LIGHT TO MEDIUM COMPONENT MANUFACTURE
TOOL DESIGN & MANUFACTURE
SMALL ASSEMBLIES, DIE & MOULD MANUFACTURE
SMALL PRESSURE DIE CASTING IN MAZAK ALLOY TO BS 1004
SUPER PRECISION HYDRAULIC COMPONENTS AND ASSEMBLIES
FOR WHICH WE HAVE HYDRAULIC TESTING EQUIPMENT
SHAKESPEARE STREET SOUTHPORT
Phone: 57696/7


CAM
cutting
If you are interested in having your cams redesigned, to give increased speeds, we have a technical leaflet on this subject which may be of interest to your Design Department.
Experimental Camshafts and Models.
zephyr
cams ltd.
24/32 Euston Buildings, Gower Street, N.W.I.
Tel : Euston 7624/5

machine shop!

✱ **COMPLETE FACILITIES**

plus precision and service second to none!

Capstan and centre lathe work · Milling—all types
Surface and universal grinding · G-SIP jig boring . . .
as well as drilling, shaping, honing, centreless grinding, copy turning, toolmaking etc., to suit your every need.

A I D & A R B

Telephone · Elmbridge 5333 (3 lines)

MARSDEN & SHIERS LTD · DAVIS ROAD · CHESSINGTON · SURREY

FOR :- MOLESEY 2216

A I D **AUTOWORK** CHUCK & BAR A R B

J. M. HARGREAVE & CO. LTD., CENTRAL AVE., W. MOLESEY, SURREY

HARVEY

MACHINE CAPACITY

Vertical boring capacity up to 16ft. diam. x 8 ft. high.
Also general machine shop work.

G. A. HARVEY & CO. (London) LTD, Woolwich Road, London, S.E.7

Telephone : GREenwich 3232 (Extension 237)

THE AVENUE ENGINEERING CO

GENERAL ENGINEERING CAPACITY

7, Warner Yard, Warner Street, Mount Pleasant, Clerkenwell, E.C.1

Telephone : TERminus 2209

Auto Screw Products, Ltd., Castle Works, Tipton Road, Dudley Tel. Dudley 55193-4. Capacity available for automatic screw machine work, capstan milling, drilling and presswork. Repetition products for all industries made to customers' specifications in any quantity. Nuts, Bolts, Screws. General turning, tool design and manufacture.

Centreless Grinding Capacity Infeed Plunge $\frac{1}{16}$in. to 4in.—CHISWICK ENG'G. LTD., Pluckington Place, Southall, Middx. Tel.: Southall 2247.

Automatic Capacity Available on Index single spindle autos. up to 2¼in. dia. —ARTHURS ENGINEERING, LTD., Hersham Trading Estate, Molesey Road, Hersham, Surrey. 'Phone: Walton-on-Thames 21277.

Immediate Capacity Available for Capstan work up to 2in. dia. bar. Also light presswork up to 40 tons.—MINE SAFETY APPLIANCES CO., LTD., Queenslie Industrial Estate, Glasgow, E.3. 'Phone: Shettleston 3421/6.

Automatic Work up to 1½in. Immediate capacity available.
TRUE ENGINEERS, LTD., Wharf Lane, Bourne End, Bucks. 'Phone 1916

Automatics, Swiss Type, Capacity available now up to 10 mm. dia. Long or short runs.—MOLBRY, LTD., 264, High Road, Harrowweald.

Spur Gear and Sprocket Cutting from blanks supplied or machined complete. 'Phone EUSton 1354.
TURNER BROS., 10, Pratt Mews, Camden Town, N.W.1.

Automatic Capacity Available. B. & S., up to 1¼in. dia.—C.B. AUTOMATICS, Bridge Works, Iver Lane, Cowley, Middlesex. Tel.: Uxbridge 33428.

Automatic Capacity Immediately available. Swiss type machines up to ⅜in. dia.—E. V. IRONS, Clovelly Works, 272, Acton Lane, Chiswick, W.4. Telephone: CHIswick 1007.

Immediate Capacity Available on CVA8 Autos, Drilling, Milling, C/Grinders, Light Press Work up to 5 tons, Small Precision Component Specialists.—NORTHERN ENGINEERING CO. (FURNESS), LTD., Farm Street, Barrow-in-Furness.

Thread Milling for the Trade up to 6in. O.D. and 5in. I.D. Any thread any quantity. Keen prices for long runs. Satisfaction guaranteed.
UNICORN PRODUCTS, LTD., 119-121, Stanstead Road, Forest Hill, London, S.E.23. Telephone Forest Hill 7688 (3 lines).

Immediate Grinding Capacity available. High Precision work on all materials. Tungsten Carbide Grinding a speciality. Manufacturers of "Special" Tipped Tools.
THE NEW ZIPPER CO., LTD., 72B, Buckingham Avenue, Slough Trading Estate, Bucks. Tel.: 25612.

• PRESS WORK •

NAISH BROS. & CO. LTD.,
124, CHELTENHAM ROAD, BRISTOL — Tel.: 25532-3.

PRESS TOOLS
FIXTURES
SPECIAL MACHINES
PRESSINGS
GEARS

Pressings and Stampings, Ltd., Eccleston Road, West Ealing, W.12. Presswork up to 130 tons. Double action deep drawing guillotine 8ft. by 10 s.w.g. Spot welding. Assembly. Toolmaking and electroplating.—'Phone: Ealing 3667-8.

Classified Advertisements (CONTRACT WORK, contd.)

A.I.D., C.I.A., A.R.B., APPROVED

WELDING & FABRICATIONS

PRESSINGS

PRESS CAPACITY UP TO 1000 TONS

· ALL MATERIALS ·

POLARCOLD LTD.,
CONGLETON · CHESHIRE TEL. 2401/3

RELIABLE SERVICE · COMPETITIVE PRICES · A.I.D. APPROVED

PRESS WORK

INCLUDING DEEP DRAWING, WELDING AND SUB-ASSEMBLY

to any tolerance, shape or quantity

ECONOMIC STAMPINGS LTD., DISRAELI ST. LEICESTER Tel: 32233

SUB-MINIATURE PRESSINGS
and multi-stage precision press work in all materials
PROMPT DELIVERIES
G. A. PRECISION PRODUCTS LTD.
No. 2 Factory Darkes Lane, Potters Bar, Middlesex
Potters Bar 6895.

METAL SPINNINGS
IMMEDIATE CAPACITY FOR METAL Spinnings, Sheet Metal Work, Welding. A.I.D. Approved M.O.S. Ref. 8026/57
HIGHBURY METAL SPINNING CO. (1955) LTD.
30 HIGHBURY PLACE, N.5. *CANonbury 2906*

TREVENA & GLOVER LTD
Specialists in Intricate Presswork
309-312 ICKNIELD STREET
BIRMINGHAM 18.
Quality contacts for the Electrical Industry.
Small and Medium Presswork in all ferrous and non-ferrous metals.
Telephone: B'ham Northern 0258.
ON AIR MINISTRY LIST
CONTRACTORS TO THE G.P.O.

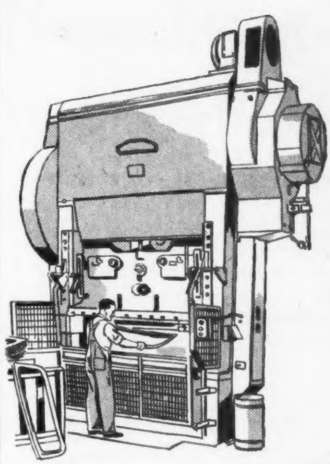
Pressings in all Metals Up To 60 tons. Press tools manufactured in our own toolroom. Light assemblies. Domestic Electrical and Mechanical. All finishes. A.I.D. and A.R.B. approved. Advice and estimates given free. Inquiries to:—
METAL COMPONENTS, LTD., Dolphin Road, Shoreham-by-Sea, Sussex. 'Phone: Shoreham-by-Sea 2224/5.

Press Tools, Jigs and Fixtures. Light Pressings up to 40 tons.—SPENCE TOOLS, LTD., 361a, Oxford Avenue, Trading Estate, Slough. Tel.: Slough 2239.

Press Productions

Pressings on auto or hand fed presses. Immediate capacity up to 40 tons. Production from our, or customer's tooling. A.I.D. approved.—Summersby Road, Highgate, N.6. TUDor 9851.

Metal Spinning Capacity available. Enquiries Invited.—A. MAISNER & CO., LTD., 12, Long Street, E.2. Sho. 6463.



PRESSWORK

Pressings in all metals up to 300 tons and in any quantity can be carried out at high speed by Vernons modern Press Work Division. Comprehensive facilities together with precision and high class service are backed by a wide experience of contract work—the following machines indicate the capacity you're offered.

Power-Presses—Double Sided

MAKE	PRESSURE (TONS)	BED (INS.)
Craig & Donald	300	84 × 48
Clearing	200	54 × 48
HME	175	30 × 29
HME	150	42 × 39
Clearing	125	54 × 42
Bliss	120	72 × 36
Toledo	80	30 × 22

Power-Presses—Single Sided

Raskin	100	29¼ × 23¾
Lee & Crabtree	80	36 × 22
HME	40	29½ × 22
Lee & Crabtree	40	28½ × 18½
Rhodes	35	28 × 18
Rhodes	30	22 × 13
Lee & Crabtree	15	18 × 11
Ward	10	17 × 11½

Power-Presses—Notching

Taylor & Challen. 6 tons. Stroke ⅜in. Effective dia. 3½in. to 17in.

Press Brakes

MAKE	Maximum Acceptance
CLEARING	¼in. × 8ft.
BRONX	14g. × 8ft. or 10g × 4ft.
EDWARDS	16g × 6ft.
EDWARDS	18g × 5ft.

Production estimates immediately supplied. Phone or write to:

VERNONS INDUSTRIES LIMITED
LIVERPOOL · ENGLAND
Telephone: Simonswood 3261

Classified Advertisements (CONTRACT WORK, contd.)

Classified Advertisements (CONTRACT WORK, contd.)

MACDOWALL

JIGS, FIXTURES
PRESS TOOLS & GAUGES
PRECISION ENGINEERS
SPECIAL MACHINERY

ROMFORD 61981

MACDOWALL EQUIPMENT
COMPANY LIMITED
NORTH STREET
ROMFORD, ESSEX

PRECISION PRESSWORK

Own Toolroom
Double action deep drawing
Double roll feeds

HOLLY ENGINEERING (Drayton) LTD
COLHAM AVENUE · YIEWSLEY · MIDDLESEX
Telephone: West Drayton 2870

QUALITY TOOLS
PRESS TOOLS • JIGS • FIXTURES
SPECIAL PURPOSE MACHINES
MACHINING
MAYSMITH
ENGINEERING CO. LTD.
290a High Road, Willesden, N.W.10
A.I.D. Tel: WIL 6688/9 A.R.B.

EST^D 1889
R·STEPHENS & SON LTD
PRESS TOOLS · JIGS
FIXTURES · MOULDS
GAUGES · DESIGNS
115 CHURCH ROAD
UPPER NORWOOD
LONDON S.E.19
PHONE
LIVINGSTONE
2265-6

GROSVENOR WORKS (Holloway) LTD.
Station Road, Tottenham Hale, N.17
Telephones: TOTtenham 7782/3

PRECISION ENGINEERS

Press Tools. Metal Stampings.
Special Purpose Machines.
Precision Machined Components.
Jig Boring.

Kellering and Cam Profiling capacity up to 8ft. by 6ft. or 6ft. diameter.
ARMYTAGE BROS. (KNOTTINGLEY), LTD.,
The Foundry, Knottingley, Yorkshire.
Telephone: Knottingley 748-42.

SPECIALITIES

Tungsten Carbide Tool Manufacturers of standard and special form tools in high speed steel and tungsten carbide. Our range includes reamers, cutters, workrest blades and wear-resistant parts. Carbide supplied to customers' specifications and express service given for emergency tooling.
DIAGRIT GRINDING CO., LTD.,
Station Road, Staplehurst, Tonbridge, Kent.
'Phone: Staplehurst 449.

ROTARY COMPRESSORS & EXHAUSTERS
Manufactured by
THE HAMMOND ENG. CO., LTD.,
Chase Side, Enfield, Middx.
Telephone: ENF. 1323 (3 lines)

NESLEIN
TOOL CHESTS
All drawers run on patented rollers.

F. C. NIELSEN & SON
31-45 Curnock St., LONDON, N.W.1. · EUS 2054

BALL & ROLLER BEARINGS

THE WORLD'S LARGEST SELECTION OF
BRITISH, AMERICAN AND CONTINENTAL BEARINGS IN ALL TYPES AND SIZES
IMMEDIATE DELIVERY FROM STOCK · KEENEST PRICES

CLAUDE RYE BEARINGS
895-921 FULHAM ROAD · LONDON · SW6
PHONE: RENOWN 6174 (Ext. 24) · TELEX 23453 · CABLES: RYE BEARINGS, LONDON
Slough Branch: 80 BATH ROAD, SLOUGH
Phone: SLOUGH 22354
Kingston Branch: 88 LONDON ROAD, KINGSTON
Phone: KINGSTON 6755 & 4142

Classified Advertisements (*SPECIALITIES, contd.*)

ANNOUNCEMENTS

•WORK TO PLACE•

Thread Grinding Capacity required for components up to 3¼in. dia. and up to 26in. long.

REILLY ENGINEERING, LTD.,
Walnut Tree Close,
Guildford, Surrey.

Machining Capacity Required in North London area for good class engineering work in Turning, Milling, Boring etc.—Apply in writing to CHAMBERLAIN INDUSTRIES, LIMITED, Argall Avenue, E.10.

Precision Machinery Capacity Required. Cast Iron Cylinders, 5ft. long, 10in. dia. Grinding. 0.0002. 12 months' work for guaranteed deliveries.—BOX C567, MACHINERY, Clifton House, Euston Road, N.W.1.

PHOTOGRAPHY

Miles & Kaye, Ltd., 102, Southampton Row, London, W.C.1. Holborn 6858. Specialists in commercial and industrial photography for over 60 years. All branches of photographic work undertaken.

Photographs by MACHINERY set the standard in engineering publicity. Our studio is one of the best equipped in the country. Ideal for really good photography of tools, attachments and portable equipment. Mobile units available for taking photographs in black and white or in natural colour in your own or your customers' works. Specimens of work submitted on request.—Full particulars from the SERVICE MANAGER, MACHINERY PUBLISHING COMPANY, LTD., National House, West Street, Brighton, 1.

PATENTS—TRADE MARKS

Kings Patent Agency, Ltd.
E. T. KING, A.M.I.Inst.E.
Registered Patent Agent,
146A, Queen Victoria Street, London, E.C.4.
City 6161. Booklet on Request.

The Proprietor of British Patent No. 751609, for "Improvements in Spraying and Atomising Nozzles, Particularly for Plantprotecting Media," desires to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from MARKS & CLERK, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

AGENCIES

Machine Tool Sales (London) Limited, having appointed a number of exclusive agents for their range of Machine Tools (Traub, Somua, Zocca, Cornac, Impco, Marposs, Constan, etc.) are open to appoint agents in the following areas: Scotland, Eire, Northern Ireland, North East Coast, Lancashire and Yorkshire.—Write only giving fullest particulars of present activities to 79, PORTLAND Place, London, W.1.

London Firm, Westminster address, with technical, secretarial and telephone facilities, wishes to represent provincial engineers. Sales, purchasing, progressing, etc. —BOX C568, MACHINERY, Clifton House, Euston Road, N.W.1.

Midland Selling Organisation requires sole agencies for machine tool equipment and also any form of consumable articles. Anything considered.—BOX C496, MACHINERY, Clifton House, Euston Road, N.W.1.

Machine Shop Capacity, Engineering Equipment, Tools, Materials or Service. Established Agent-Representative—A.M.I.Mech.E.—with excellent connection in London and Home Counties, seeks sound agency, mainly or wholly on a commission basis.—BOX C570, MACHINERY, Clifton House, Euston Road, N.W.1.

MATERIALS FOR SALE

Storage Bins, 18in. × 10in. × 5in. deep 3s., Pressed Steel Shelves 4ft. 6½in. × 9¾in. × 16 gauge 2s. 6d., Strong Storage Racks 15ft. 6in. × 4ft. 6in. × 6ft. or 12ft. high, good condition.—LOWTON METALS, LTD., Sandy Lane, Lowton St. Mary's, Leigh 71441/2.

Surplus Mild Steel For Sale, 20G to 14G. Offset 30G. to 14G. Cold Reduced and Hot Rolled Strip Mill, 6 by 8 by 22G. terneplate.—E. STEPHENS & SONS, LTD., Bath Street, E.C.1. CLE. 1731/4.

B.M.S. Strip, Coiled, Approx. 7 cwt. 11/16 wide, 5 cwt. ¾in., 3 cwt. 1¼in., all 27 s.w.g., cheap to clear.—Phone: WOKING 5192.

MATERIALS WANTED

Classified Advertisements (*ANNOUNCEMENTS, contd.*)

PACKING AND SHIPPING

R. & J. PARK, LTD., Dominion Works, Chiswick, England. Export packers, shippers, and forwarding agents, specialists in packing heavy machinery.

BUSINESS FOR SALE

Valuable Heavy Industrial Free-hold Site. 66ft. main road Frontage, Croydon. Approx. 15,000 sq. ft. All Services. Full Details—Sole Agents:

S. M. DANCY & CO., 8A, Whitehorse Road, Croydon. THO. 5405.

ELECTRIC MOTORS

Electric Motors, New and Secondhand, over £1,000 always available for sale, part exchange or hire. Prompt repairing service in event of breakdown.—JOHN RODWELL, LTD., Vicarage Road, Hornchurch. Hornchurch 48877 (3 lines).

PLANT WANTED

WANTED

ROTARY TABLE SURFACE GRINDER

ARTER, CHURCHILL OR SIMILAR
GOOD CONDITION ESSENTIAL

24in. Capacity preferred, would consider 16in.

Details to:

HOLLAND & CAESAR, LTD.

Grinding Specialists

3/5, LEIGHTON PLACE, LONDON, N.W.5

Telephone: GULliver 3047 & 6444

WANTED GOOD MACHINE TOOLS

Offer your Surplus Tools to us.
We pay a good price.

M. WARD

(MACHINE TOOLS) LTD.
1, KILBURN HIGH ROAD,
LONDON, N.W.6.

Telephone: MAIDA VALE 1195-96.

Telegrams: Emwarneer, Kil., London.
One minute from Kilburn Park Station, Bakerloo Railway.

2 ms

WANTED!

USED MACHINE TOOLS

We offer generous prices for your plant or accept in part exchange for modern equipment

E·H·JONES (MACHINE TOOLS) LTD

48, HIGH STREET, EDGWARE

Telephone: EDGware 4488
Midland 5593 . Birmingham

DOUGLAS
OF HIGH WYCOMBE

- ★ We would be pleased to purchase your Surplus Modern Machine Tools.
- ★ Generous offers made for Latest Style Machines.
- ★ Inspection Arranged at Once.
- ★ Britan Repetition Lathes a Speciality.
- ★ Cash or Part Exchange Basis.

A. DOUGLAS CO. LTD.
LINCOLN ROAD,
HIGH WYCOMBE,
BUCKS.

Tel: H.W. 4390 (5 lines).

Wanted, Good Class Gear Cut-ting Machines. Sykes V-10-A, also Mikron types No. 79 and No. 132.—Description and price, BOX C463, MACHINERY, Clifton House, Euston Road, N.W.1.

WANTED!

GOOD CLASS MACHINE TOOLS POWER PRESSES & SHEET METAL MACHINERY

EDWIN MILLEN & SONS LTD.
70 Clerkenwell Road, London E.C. 1
'Phone: CLErkenwell 6064

WANTED
MODERN MACHINE TOOLS

We pay cash for single machines or complete plants

SEND US DETAILS
IMMEDIATE INSPECTION ARRANGED

SOUTHERN ENGINEERING AND MACHINERY CO.
CONNAUGHT BUILDINGS,
TANNERS BROOK, MILLBROOK,
SOUTHAMPTON

Telephone: Southampton 73101/2/3

A. LAWRENCE & CO. (MACHINE TOOLS) LTD.

will be pleased to purchase your surplus Modern Machine Tools either on a cash or part exchange basis. Ask our representative to call and inspect.

Welsh Harp, Edgware Road, London, N.W.2

Telephone: GLAdstone 0033

B.G. MACHINERY LTD., Montgomery Street, Sparkbrook, Birmingham, 11, will pay good prices for Machine Tools of first-class make and in good condition.—'Phone: VICtoria 2351/9.

Machine Tools, Power Presses and Sheet Metal Machinery. Single machine or complete plant purchased. Immediate Inspection.—ALBERT EDWARDS (MACHINERY), LTD., 79/89, Pentonville Road, London, N.1.

Longford Machine Tool Co., Ltd., Longford Road, Coventry, will pay good prices for any type of machine tool which is in good condition, and is of first class make. Only machines motorised 400/3/50 will be considered. —Write or 'phone Coventry 87481/2.

CENTAUR TOOL WORKS, Birmingham 18, pay best prices for good modern secondhand Machine Tools by first-class makers. Write or 'phone and our representative will call.—'Phone EDGBASTON 1118 and 1119. Grams: Capstan, Birmingham.

SURPLUS MACHINE TOOLS REQUIRED

OFFER YOUR MACHINES TO

J. E. RAISTRICK LTD.

POYLE TRADING ESTATE
COLNBROOK, SLOUGH,
BUCKS.

TEL: COLNBROOK 2421

WANTED URGENTLY

Private Buyer wishes to purchase

POST-WAR WARD 2A, 3A and 7 CAPSTANS

in good second hand condition. Prepared to travel and negotiate immediate cash purchase. Please give all particulars including Serial No., Tooling available, price, and where to inspect.

WOODFIELD ROCHESTER LIMITED
Frindsbury Works, Rochester, Kent

MCL

WE ARE KEEN BUYERS OF GOOD MODERN MACHINE TOOLS. INSPECTION WILL BE ARRANGED AT ONCE.

M. C. LAYTON LTD.

Abbey Wharf,
MOUNT PLEASANT
ALPERTON, MIDDLESEX

Telephone: WEMbley 9641-8

Hydrotel Required With 360 deg. Profile Tracing Head.—Full details to RONALDSWAY AIRCRAFT CO., LTD., Balla Salla, Isle of Man.

Power Presses, Power Guillotines, Sheet Metal Machinery, urgently required.—STANCROFT, LIMITED, Lancaster St., Birmingham 4. Aston Cross 3741 or 2235.

Sealed Quench Furnace; Pit type Gas Carburising Plant and any type Carbonitriding Plant, all required urgently.—BOX C525, MACHINERY, Clifton House, Euston Road, N.W.1.

WANTED

Good Class Used MACHINE TOOLS

Write or phone

STANCROFT LTD.

BEDWORTH ROAD,
COVENTRY

Telephone: Coventry 88072

Wanted, Brown & Sharpe and C.V.A.8 Single Spindle Automatic.—MELBOURNE ENGINEERING CO., LTD., Melbourne, Derbyshire. Phone: Melbourne 232.

Wanted Urgently

Late Type Machine Tools

Best Prices are offered for latest types of Machine Tools. Send us details of what you have and our representative will call to inspect.

J. B. MACHINE TOOL CO. LTD.

312 BRADFORD ST., BIRMINGHAM 5

Telephone: MIDland 4375

Harry Kirk Will Purchase modern quality machine tools for cash Whole plants or individual items. Full details to:—

HARRY KIRK ENGINEERING, LTD.,
Machine Tool Division,
Brandon Road Works,
Brandon Road, Coventry.
Telephone: Walsgrave-on-Sowe 2253/6.

Wanted, Universal Grinder for precision toolroom work. Size 24in. to 36in. Must be in good condition. View London or Southern area.—H.P.C. (ENGINEERING), LTD., 206, London Road, Burgess Hill. Tel.: Burgess Hill 2085.

Asquith OD.1. 4ft. 6in. Radial Drilling Machine, with box table, 400 volts, 3-phase, 50 cycles.—BOX C571, MACHINERY, Clifton House, Euston Road, N.W.1.

WANTED

LARGE PLANING MACHINE

20ft. by 8ft.

Box C569, MACHINERY,
Clifton House, Euston Road, N.W.1

WANTED

All types of modern

MACHINE TOOLS

Chipping Sodbury 3311

NEWMAN INDUSTRIES LIMITED
YATE · BRISTOL

Smart & Brown Type L.15 Second Operation Lathe required.—BOX C563, MACHINERY, Clifton House, Euston Road, N.W.1.

Wanted, One Each 2 Ton and 4 ton Fork Lift Trucks, either petrol or diesel driven, approx. 10 to 12ft. lift.—NORMAN WALKER (MACHINERY) LIMITED, Anlaby, Hull.

Heavy Duty Roll Turning Lathe. Slow speed. Suitable for profiling chilled iron tube reducing mill rolls, 9¼in. o.d. × 4⅝in. face width.

Any condition considered.

Particulars to:

THE PROTHERO STEEL TUBE CO., LTD.,
Wednesbury, Staffs.

Wanted. Precimax Cylindrical Grinder, 5 × 18.—BOX C565, MACHINERY, Clifton House, Euston Road, N.W.1.

Modern Good Class Machine Tools and Sheet Metal Machinery required for prompt cash.—H. BELL (MACHINE TOOLS), LTD., Walter Street, Leeds, 4. Tel. 63-7398.

Wanted: Compression Press. 50-75 tons Hand-operated Hydraulic Press. Hand closing wheel. Finney, Bradley & Turton, or similar. Electric platens preferred.—YARSLEY RESEARCH LABORATORIES, LTD., Clayton Road, Chessington, Surrey. EMB 5515/8.

---

200 Ton Single Action Blanking Press, 8in.-10in. stroke. Air cushion 20-30 S.P.M. 200 ton Single Action Blanking Press., 16in.-18in. stroke. Modern machines.—BOX C562, MACHINERY, Clifton House, Euston Road, N.W.1.

PLANT FOR SALE

HENRY BUTCHER & CO.
Specialists in the
• SALE AND VALUATION OF FACTORIES, PLANT AND MACHINERY •
73 CHANCERY LANE, LONDON, W.C.2
TEL.: HOLBORN 8411 (8 lines) GRAMS: PENETRANCY, HOLB., LONDON

Siemens Schuckert Electrically Heated Furnace, 6ft. 10in. dia., 8ft. 10in. deep, 550 deg. C., 100 kW. 400 volts.

New Process 100 kVA Seam Welder, 400/3/50

British Federal 50 kVA Flash Butt Welding Machine. 400/3/50.

Fielding Hydraulic Pipe Bender, up to 8in.

200 Ton Fielding Downstroke Hydraulic Press, 14in. ram, 42in. stroke, 63in. daylight.

100 Ton Fielding ditto, 10in. ram, 72in. stroke, 99in. daylight.

50 Ton Fielding ditto, 3ft. stroke.

Bliss 70 Ton Geared Double Sided Power Press, 400/3/50 supply.

3 Bliss No. 304 Vertical Single Action Drawing Presses, 7½in. stroke, 50 tons. American.

Bennie Punching, Shearing and Section Cropping Machine, 4½in. × 4½in. × ⅜in. angle.

Windsor 6-oz. Plastic Injection Moulding Machine, also Peco type 40M, 9-oz. capacity.

Rushworth Guillotine, 6ft. × ¼in.

"Pyramid" Bending Rolls, 9ft. 0in. × ⅜in. capacity.

Scriven 4ft. 0in. × ⅜in. Hand Bending Rolls.

Besco 4ft. 0in. Hand Folding Machine.

200 Tons Tangye Hydraulic Straightening Press, bed 25ft. × 3ft., stroke 21in., motorised travelling table, 2 ram pump.

Hugh Smith Double Table Scarfing Machine, 13in. fixed stroke, from 16in. to 8ft. wide, 1¼in. thick steel plates.

Archdale 4ft. Radial Drilling Machine.

Colchester 7in. Centre Lathe, 7ft. gap bed.

Crow, Harvey Punch, Shears and Angle Cropper, 18in. blade, 27in. throat, heavy duty.

Pels Punch Shears and Cropper, 12in. blade, shear ¾in., takes 6in. × 6in. × ⅜in. angles.

Robertson Shears, ½in. capacity, 10 h.p., 28in. blade, 9in. maximum opening. (Two.)

Berry Plate Guillotine, capacity 4ft. × 1in., 18in. throat, 30 h.p. motor.

New 1-cwt. and 2-cwt. Hammers by Dassey and Alldays & Onions, also 3-5-cwt. secondhand E.O.T. Cranes.

25 Ton Clyde 21ft. 9in. span, cab control, 1954. Can convert any span to 95ft.

20 Ton Vaughan, 42ft. 3in. span. Unused.

10 Ton Heywood, 34ft. span. Unused.

10 Ton Morris, 32ft. 10in. span, cab control.

10 Ton, 60ft. span. 1955. (Two.)

7 Ton, 37ft. span. 1950. (Two.)

5 Ton, 37ft. span. 1944.

3 Ton Morris, 149ft. span. 1954.

FRED WATKINS (ENGINEERING), LTD., Coleford, Glos. 'Phone: Coleford 2271 (5 lines).

NEW & USED MACHINE TOOLS AND EQUIPMENT

Now available
HORIZONTAL TAPPING MACHINES
Capacities ⁵⁄₁₆in. ⅜in. ½in.

WILKINSON.
MACHINE TOOLS CO
5, VILLAGE WAY,
PINNER, MIDDLESEX.
Telephone: FIELD END 6529.

Micromatic Hydrohoner Hydraulic Honer. Model H1. Auto cycle. Table 11¼in. × 10in. W/S. Ind. Motors.—WILCOX & CO., Barr Street, Birmingham, 19. NORthern 1234/5.

A Good Number of High-class Machine Tools always in stock.—M. ELLISON (SALFORD), LTD. Cook Street, off Chapel Street, Salford, 3, Lancs.

Choose from

HUNDREDS *of*
MACHINE TOOLS

at the

FJE MACHINE CENTRE

Islington Park Street, London N.1.
(on the A1, near Highbury Corner)

Cash or monthly account, hire purchase, or by the FJE Machine Hire Plan

F. J. EDWARDS LIMITED
359-361 Euston Rd. London N.W.1

LEONARD ROTH
ABBOT ST., KINGSLAND HIGH ST.,
DALSTON JUNCTION,
LONDON, E.8
TERMS ARRANGED

Tel.: CLIssold 0513/4

4ft. 6in. Radial Drill, power lift to arm, separate box table, 400/3/50. £150.
TOWN 6ft. Radial Drill, power lift to arm, separate box table, 400/3/50. £295.
KEETONA Power Guillotine, 4ft. × 16 gauge, 400/3/50. £150.
5ft. × 4½in. Geared Bending Rolls, ⅛in. capacity. £65.
48in. × 3in. Geared Bending Rolls, slip type. £45.
EDWARDS 12 Ton Adjustable Stroke Power Press, 400/3/50. £165.

PLEASE WRITE FOR LISTS

Barber Colman No. 3 Gear Hobber—motorised 400/3/50.—C. DUGARD LTD., Denmark Villas, Hove 32471.

DIMCO

2S. **HERBERT** Bar Feed Capstan Lathe.
2SS. **HERBERT** Bar Feed Capstan Lathe.
No. 7. **WARD** Bar Feed Capstan Lathe, covered bed.
4ft. **ASQUITH** Universal Drill. Portable.
6ft. × ⁵⁄₁₆in. **BENNIE** Guillotine. Heavy Duty.
8½in. **LANG** S.S. & S.C. Lathe, 4ft. between centres.
36in. × 10in. **FRITZ WERNER** Plain Miller.
New 7in. **WOODHOUSE & MITCHELL** Type 70 Junior Lathe.
GLEASON Bevel Gear Generator and Cutter Sharpener.
8½in. **MITCHELL**, 4ft. 3in. between centres, complete with comprehensive equipment.
60in. **JACKSON & BRADWELL** Balancing Machine.
20in. **ARCHDALE** Plain Milling Machine. Power feeds and rapids.
½in. **HERBERT** Pedestal Drill.
6in. **HOLBROOK** Toolroom Lathe.
15in. S.S. & S.C. Heavy Duty **OLDFIELD & SCHOFIELD** Lathe. Bed 12ft. 6in. Spindle speeds 65-332 r.p.m. Screwcutting speeds 1½-22 threads.
14in. **BUTLER** Slotting Machine. Circular table.
8½in. **FABIUS** Lathe, 5ft. between centres. (New.)
Model HBY **CHURCHILL** Internal Grinder.
No. 3 **KITCHEN & WADE** Vertical Honer.
No. 2 **DRUMMOND** Maxicut Gear Cutter.
27in. **WOTAN** Hydraulic Shaper.
16in. **BLANCHARD** Rotary Surface Grinder.
New **PASQUINO** Vertical Mill. Swivel head, power feeds and rapids.
New 35½in. **ZERBST** Lathe, 10ft. 4in. between centres.
New 10in. × 40in. **MIKROMAT** Hydraulic Surface Grinder.
24in. × 36in. **BULLARD** Vertical Borers.
No. 2 **WARNER & SWASEY** Chucking Capstan.
24in. × 8in. **ABRASIVE** Model 3B Surface Grinder, with magnetic chuck. As new.
New **LAGUN** 44in. × 11½in. Universal Miller, with dividing heads and universal attachment. Power feeds and rapids in all directions. £1,100.

DIMCO (Gt. Britain) LTD.
28, Wood Lane,
SHEPHERD'S BUSH,
LONDON, W.12
SHEpherds Bush 4401/2

Newall No. 1 Jig Borer—Very little used with temperature controlled sectional housing. Victoria U.1 Milling Machines (three) with one vertical head. Asquith Profile Mill (all in good condition).

Offers to: SCOTT ENGINEERING (BOURNEMOUTH) LTD., 68, Old Wareham Road, Parkstone, Poole, Dorset. Parkstone 4455/6.

Classified Advertisements (*PLANT FOR SALE, contd.*)

BULLARD 16in. 8 SPINDLE MULT-AU-MATIC

In excellent condition.
Complete with chucks.
Single indexing unit.

THIRD NEW PRICE
£9,364 delivered.
Lying in our U.S.A. Store.

K & C MACHINERY LTD.
STEPHEN STREET, COVENTRY
23669

K·E·N·T

MILLING AND HOBBING

Maximiller Vert. Mill, 76in. × 18in., 888 T/S. Power to spindle and rapid all ways. REBUILT.
Somua F.V.2C, 60in. × 14½in. Vert. As new.
Herbert 18V Vert., 57in. × 14in. With rotary table. £525
Becker Vertical, 54in. × 14in. £150
Sant Andrea U.F.O.3, 57in. × 14in. As new.
Archdale 24in. Manufacturing. £185
Adams No. 5 Spline and Thread Hobber. £425

PRESSES AND SHEET METAL MACHINERY

Edwards 6ft. × ¼in. Rolls. New. £295
S. Platt 3in. × 14g. Tube Roller. £395
C.V.A. 10 Ton Dieing Press. Roll feed and scrap cutter fitted.
Kendall & Gent Duplex Screwing M/c. Tangential heads, 2¼in. cap. £400

CAPSTAN LATHES

Ward 2A. Feed to saddle.
Gisholt No. 3 Capstan. £275
Brown & Sharpe No. 2. 1in. cap. £145
Herbert No. 9 Turret.
Smart & Brown ½in. cap. Capstan.

LATHES

Willson 8½in. × 4ft. 6in. S.S. & S.C. £495
Niles 40in. swing × 5ft. Heavy Duty. £995
Dean, Smith & Grace S.S. & S.C., 36in. swing, 12ft. 6in. between centres.
Ditto. Non-screwcutting.
Churchill-Redman 6½in. × 3ft. 6in. £325
Lang 6½in. × 3ft. £225
Dean, Smith & Grace 8½in. Surfacing and Boring.

MISCELLANEOUS

Acme Gridley 6-sp. Auto, ⅞in. cap.
Maiden Bar-ending Machine.
Granor 26in. Heavy Duty Shaper. £575
Coventry Climax 1,500lb. Fork Lift Truck.
Cincinnati 12in. × 48in. Univ. Grinder. £750

Many other machines in stock.
All motorised 440/3/50.

K·E·N·T MACHINERY & ENGINEERING CO.
Datchelor Place Mews, London, S.E.5
Telephone: ROD. 4149

Archdale Multi-spindle Drilling Machine, Size O. Table 20in. × 20in. 10 spindles No. 1 Morse taper. Motorised 400/3/50.—BOX C550, MACHINERY, Clifton House, Euston Road, N.W.1.

6-spindle 1⅝in. Dia. Bar Capacity Greenlea Automatic Machine. Excellent condition, well equilpped with Tools and Attach. ments.—For detais write to BOX C551, MACHINERY, Clifton House, Euston Road, N.W.1.

⅞in. Capacity 6-spindle B.S.A. Acme Gridley Bar Automatic. Tooling, Collets, Feeders, Drilling Spindle. Inspection London area. Delivered in 1947, reconditioned in 1955 by reputable company.—Telephone Mr. GANDER, Byfleet 23252.

USED MACHINES EX STOCK

SOMUA Horizontal Milling Machine, table 67in. × 14½in., spindle speeds 32 to 1,250 r.p.m. No. 50 I.T. 18 feeds $\frac{5}{16}$in. to 10$\frac{7}{16}$in. per min., power feeds and rapid traverse in all directions. 1952 machine.
LE BLOND Lathe, 18in. swing × 9ft. between. A.G.H. S.S. & S.C. Speeds 15 to 522, double vee straight bed.
CINCINNATI Plain Hydromatic Mill 3/36, speeds 27 to 200 r.p.m., power rapid traverse with auto cycle.
CORONA Cluster Head Drill, 12MX. Pedestal machine. 10 spindles, size B with spare set of complete spindles. Table 14in. × 8½in. 2-speed electric drive. 415/3/50.
CORONA Cluster Head Drill, 6 MXP. Pedestal machine, 10 spindles, size B with spare set of complete spindles, table 8in. × 6in., 2-speed electric drive, 415/3/50
ASQUITH OD1 4ft. 6in. Radial Drill, 12 speeds 58 to 1,550 r.p.m. No. 5 M.T., 2 motors, power rise and fall, power feed spindle, loose box table.

All machines motorised 415/3/50.

A. LAWRENCE & CO., (MACHINE TOOLS) LTD.,
WELSH HARP, EDGWARE ROAD, LONDON, N.W.2.
Tel.: Gla 0033

The "Coxeter" Revolving Centre from 70s. All sizes from stock.—REVOLVING CENTRES, LTD., Oxford.

Huller UG3 Radial Arm Tapping Machine, ½in. cap., 48in. swing. Box table. Mot.—WILCOX & CO., Barr Street, Birmingham 19. NORthern 1234/5.

ELLIOTT
INVITES YOU

to see the range of
FINE MACHINE TOOLS *at*
B. ELLIOTT (MACHINERY) LTD
VICTORIA WORKS, LONDON, N.W.10
Tel. ELGAR 4050

Drum Making Plant For Sale. All plant for drums with double seamed and circumferential welded tops and bottoms, welded side seams, with tools to suit drums 6in., 7in., 8in., 9in., 11in. and 12in. dia., and from 7in. to 16in. high. The plant consists of 18 machines.—Full specifications and illustrations, etc., from F. J. EDWARDS LIMITED, 359, Euston Road, London, N.W.1, or 41, Water Street, Birmingham, 3.

STANCROFT OFFER THE FOLLOWING LATHES:

SWIFT 8½in. × 54in. Between Centres Gap Bed Lathe. 12 speeds. 14-500.
STANLEY 7in. × 6ft. 6in. Between Centres Gap Bed Lathe. 8 speeds, 20-360.
LE BLOND 8in. × 30in. Between Centres Straight Bed Lathe. 12 spindle speeds 20-600.
DEAN SMITH & GRACE 6½in. × 30in. Between Centres Straight Bed Lathe. 12 spindle speeds, 29-889.
MONARCH 7in. × 30in. Between Centres, 16 speeds, 17-700, Straight Bed Lathe.

All motorised for 400/3/50 supply.

All the above may be inspected at

STANCROFT LTD.
72, DUDLEY ROAD, WOLVERHAMPTON
'Phone: 25661.

DO YOU REQUIRE A CASH ADVANCE TO EXPAND YOUR BUSINESS?

WE CAN ADVANCE YOU A LOAN AGAINST THE SECURITY OF YOUR INDUSTRIAL MACHINERY AND EQUIPMENT. NO AMOUNT TOO LARGE. NO FUSS OR FORMALITIES.

Write, phone or call
FOREMOST FINANCE
10 Tofts Road · Cleckheaton · Yorkshire
Phone. Cleckheaton 4198

Classified Advertisements (*PLANT FOR SALE, contd.*)

WIDDOWSONS

WARD No. 13
COMBINATION TURRET LATHE

Covered Bed, 25in. Concentric Chuck, 27in. 4-Jaw Independent Chuck, Good Turret, Tooling Taper Turning Attachment, 35-h.p. Motor, 400/3/50.

MODERN MACHINE — EXCELLENT CONDITION

CINCINNATI HYDROMATIC 56-72
PLAIN HORIZONTAL
PRODUCTION MILLING MACHINE

Table [size] 103in. by 26in., Spindle speeds 24 to 179 r.p.m. Coolant pump and fittings, etc. 400/3/50.

EXCELLENT CONDITION

PEARN-RICHARDS PRT2N
HORIZONTAL BORING and
FACING MACHINE

3in. Traversing Spindle. Chain Drive to Head. Coolant Fittings. 400/3/50.

SCARCELY USED

REINECKER 10 ft.
AUTOMATIC GEAR SHAPING
MACHINE

For Internal and External Spur Gears, Face width 7in. Max. Pitch 1 D.P.

MODERN MACHINE — EXCELLENT CONDITION

HERBERT WIDDOWSON & SONS LIMITED

Canal Street Works, Nottingham · Telephone : 51891 (4 lines)

MEMBER OF B.A.M.T.M.

4ft. **KITCHEN & WADE** Centralised Control Radial Arm Drilling Machine. Spindle speeds 80-1,500 r.p.m. With tapping and reverse. Four rates of automatic feed. Maximum capacity in steel 3in. Cast iron $3\frac{1}{2}$in. Power rise and fall to radial arm. Flange mounted motors, 30in. × 30in. × 36in. loose box table. Electric pump and fittings. Motorised 400/3/50.

DIMCO (Gt. Britain) LTD.,
28, WOOD LANE,
SHEPHERD'S BUSH,
LONDON, W.12.
Tel.: SHEpherds Bush 4401/2

Victoria U3 Complete with Vertical lead and slotting attachment, rapid traverse, all power feed, excellent condition.
Victoria U4 as new, very little used.
Both may be seen by appointment at H & M ENGINEERING, Gillingham, Kent. 'Phone: 52351.

Gordon Try Ltd

MEMBER OF THE B.A.M.T.M.

ARTER A1 12in. Rotary Surface Grinder.
MAAG P.H.60 Involute and Lead Testing Machine.
WICKMAN Optical Profile Grinder.
WICKMAN Cutter HD Grinder.
P. & W. (HELLER) R6 Cutter and Radius Grinder.
ROWLAND Tool and Disc Grinder.

THE CAUSEWAY, EGHAM, SURREY
Tel.: Egham 4166-7

Brown & Sharpe No. OOG Automatic Screw Machines. Integral Motor Drive.—WILCOX & CO., Barr Street, Birmingham, 19. NORthern 1234/5.

Eye Bending Machine For Sale. For forming an eye in the end of rods or bars from $\frac{1}{16}$in. to $\frac{5}{8}$in. diameter. By Williams, White & Co., U.S.A. Size No. 22. Weight about 20 cwt.—Photo, etc., from F. J. EDWARDS, LIMITED, 359, Euston Road, London, N.W.1, or 41, Water Street, Birmingham 3.

Mas VR4 48in. Radial Drill.—New.—C. DUGARD, LTD., Denmark Villas, Hove 32471.

Corona Heavy Duty Vertical Drilling Machine. No. 5 Morse Taper Excellent condition.
Further details from:—
C. & G. OLDFIELD, LTD.,
15, Abercorn Street,
PAISLEY.

Conomatic 8-spindle $1\frac{1}{4}$in. Capacity Auto. Excellent condition and well equipped, including Screwing, Spindle, High Speed Drilling attachments, Collets, Feeders, Stock Reel and Stand. Inspection by appointment.—Apply to BOX C548, MACHINERY, Clifton House, Euston Road, N.W.1.

SHEET METAL MACHINERY, MACHINE TOOLS, PRESSES, PLASTICS AND WOODWORKING MACHINES.

New and used — many of each EX STOCK — for cash or monthly account, hire purchase or by the F J E Machine Hire Plan.
May we tell you more ?

F.J. Edwards Ltd

EDWARDS HOUSE
359-361 EUSTON RD., LONDON, N.W.1
Phones: EUSton 5000 Telex 24264[illegible]
and Lansdowne House
$41\frac{1}{2}$ Water St., Birmingham 3
CENtral 7606-8

Classified Advertisements (*PLANT FOR SALE, contd.*)

Classified Advertisements (*PLANT FOR SALE, contd.*)

FORD AND SLATER LIMITED,
MOTOR ENGINEERS, GWENDOLEN ROAD, LEICESTER,

have the following machines for disposal, all in first class working condition:—

ONE **CHURCHILL** Type DE Crankshaft Regrinding Machine, 30in. × 120in. Fitted with Phillips Magnetic Clarifier.

ONE **CHURCHILL** Type CY Grinding Machine, 18in. × 48in. Fitted with Phillips Magnetic Clarifier. Complete with 4-jaw chucks.

ONE **KITCHEN & WADE** Honing Machine. Fitted with George Alexander honing heads, 2.20in.-6.00in. dia. capacity.

ONE **CUTHBERT** Connecting Rod Boring Machine. Complete with all accessories.

Telephone: LEICESTER 36117

GLEASON SPIRAL BEVEL EQUIPMENT.

USED **GLEASON** No. 16 Spiral Bevel Hypoid and Zerol Gear Generator Condition As New. Complete Standard Jobbing Machine equipped with large assortment of Index and Ratio of Roll Change Gears plus Feed and Speed Change Wheels.

USED **GLEASON** 12in. Automatic Cutter Sharpener for Sharpening Spiral Bevel and Hypoid Cutters. Condition Excellent. Complete Machine Fully Automatic. Spare Grindstones.

USED TESTING MACHINE for the above equipment.

BUFFOLINE GEARS LTD.,
CHAPEL STREET, LEVENSHULME, MANCHESTER, 19
Tel.: Rusholme 2838/9.

Power Press. Ratzer 12 tons. 1½in. stroke. Inclinable. Few months use. Redundant. Cost £197 0s. 0d. Space urgently required. £70 0s. 0d. View Brighton.—BOX C504, MACHINERY, Clifton House, Euston Road, N.W.1.

GEORGE FISCHER type SDM.3 Rigid Hydro Copying Lathe.

REINECKER type SMO 6in. Gear Shaper.

KITCHEN & WADE 8ft. Girder Radial Drill. No. 5 M.T.

BULLARD type "J" Multi-Au-Matic 8-spindles. 10 chucks, 25 H.P.

NORMAN E. POTTS (MACHINERY) LTD.
151/154 SANDY LANE, BIRMINGHAM, 12.
Tel.: VIC 1278.

Churchill 10in. × 24in. Universal Grinding Machine (1944). With steadies, etc.—BOX C549, MACHINERY, Clifton House, Euston Road, N.W.1.

CLEVELAND 1½in., 2in. and 2½in. Autos.
MASSEY 5 cwt. Press Hammer (1942).
Five **UNION** ¾in. Pedestal Drills (New).
VICTORIA V2 Swiv. Head Mill. 1954.
BULLARD 16in. sp. Mult-Au-Matic.
GLEASON 12in. Bevel Gear Gen. 1945.
FELLOWS 61A, 645A Gear Shapers.
BRYANT 16-38 Internal Grinder.
HEENAN-FROUDE Bailing Press. 1947.
SCHULER Vertical Dieing Press.
HME L40 INC. Press. Roll Feed.
REDMAN 12 × 4 × 4 Planer.
HERBERT 98 Turret Lathe.
PROGRESS 5E High Speed Drill.
MILWAUKEE 2H, 2K, 3H, 3K Millers.
ADCOCK & SHIPLEY 28in. Drill.
BLISS 304A 50-ton Press, 4in. stroke.
POLLARD 28in. Prod. Drill, 5 M.T.
NORTON 14 × 72 Univ. Grinder.
BROWN & SHARPE No. 3 Univ. Grinder.
DEFIANCE 25A Horizontal Borer.
ARCHDALE 38in. Sens. Radial Drill.
CHURCHILL-REDMAN 11 × 60 Gap Lathe.
HERBERT 4 Auto Chucking Lathe.
NEWALL type L 10 × 24 Grinder. 1942.
BUTLER 8in. Toolroom Slotter.
PLAUERT Horiz. Borer, 3⅝in. spindle.
HEALD 72A Internal Grinders (3).
JONES & LAMSON 7A Turret Lathe.
NORTON 12 × 36 Universal Grinder.
WARNER & SWASEY 3, 5 and 2A Turrets.
BROWN & SHARPE No. 3 Vert. Mill. 1942.
PRATT-WHITNEY 12B 2-sp. Profiler. 1941.
EDGWICK No. 2 Universal Miller.
BARNES No. 2 Horizontal Hones (3).
CHURCHILL No. 1 Planetary Grinder.
ORCUTT HM24 Gear Grinder. 1944.
RYDER WELLMAN Horiz. Borer. 3in. sp.
GISHOLT 4, 5 and 1L Turret Lathes, 1941-43
TIMBRELL & WRIGHT 2A and 3 Capstans.
GRIDLEY Model R, 2⅝in. cap., 4 sp. Auto.
ARCHDALE 30in. Vert. Mill. 1942.
CINCINNATI 2MH Plain Mills.
MONARCH Copying Lathe. 1946.
GREENLEE 1⅝in. cap. 6 sp. Automatics.
CHURCHILL PBH 12 × 36 Univ. Grinders.

All modern fully motorised machines.

J. B. MACHINE TOOL CO., LTD.,
312/4, BRADFORD STREET, BIRMINGHAM, 5.
Tel.: MIDLAND 4375
AND AT WOLVERHAMPTON

Bullard Vert. Auto. Type J—7in. double indexing—8 spindles.—C. DUGARD LTD., Denmark Villas, Hove 32471.

Bar Heating Furnace For Sale, Incandescent Double Ended, Gas Fired, suitable for heating bars prior to bending, forming, stamping and piercing, etc. Temp. 900-1,350 deg. C. Working slots 30in. wide × 5in. high. Length 32in. Photo.—F. J. EDWARDS LIMITED, 359, Euston Road, London, N.W.1, or 41, Water Street, Birmingham, 3.

Landis 12in. × 36in. External/ Internal Grinding Machine with Excello Internal Spindle. Chucks and Steadies. Good condition. If interested telephone Mr. GANDER, Byfleet 43252.

Taylor & Challen B3½ Power Press. 60 tons capacity. 3in. stroke. Fitted 9in. double roll feed. Motorised.—WILCOX & CO., Barr Street, Birmingham, 19. NORthern 1234/5.

Two—2A **WARD** Capstan Lathes with Bar Feed.

DIMCO (Gt. Britain) LTD.
28, Wood Lane, SHEPHERD'S BUSH, LONDON, W.12.
SHEpherd's Bush 4401/2.

Cashmores

Selection of Machine Tools from Stock

CENTRE LATHES

SWING 16½in. S.S. & S.C. All Geared Head Gap. Bed Lathe, to admit 10ft. 6in. between centres.
SWIFT 15in. S.S. & S.C. All Geared Head Gap Bed Lathe to admit 8ft. between centres.
FAIRBAIRN 13in. S.S. & S.C. Lathe with two saddles, to admit 17ft. between centres.
COLCHESTER 8½in. S.S. & S.C. All Geared, Gap Bed Lathe to admit 6ft. 6in. between centres.
LANG 8½in. S.S. & S.C. Lathe, to admit 4ft. 0in. between centres.
VOLMAN 8in. S.S. & S.C. Gap Bed Lathe, to admit 4ft. 6in. between centres.

BORING MACHINES

SCHARMANN Horizontal Boring, Facing, Milling and Drilling Machine, with 3⅛in. diameter spindle.
WEBSTER & BENNETT 48in. Vertical Boring Mill, table speeds 4-88 r.p.m.

DRILLING MACHINES

New **PROGRESS** 5E Pillar Drilling Machine, 2in. capacity, rectangular table, wet model.
New **KITCHEN & WADE** E.26 4ft. 6in. Radial Drilling Machine.
RICHMOND SR1 36in. Sensitive Radial Drilling Machine.
New **PROGRESS** 4E Pillar Drilling Machine. 1¼in. capacity, wet or dry models.

GRINDING MACHINES

NORTON 6in. × 18in. Horizontal Spindle Surface Grinding Machine with hydraulic feed.
LUMSDEN Model 90LE Vertical Spindle Rotary Table Surface Grinding Machine, with 24in diameter magnetic chuck.
NORTON 6in. × 30in. Hydraulic Plain Cylindrical Grinding Machine, maximum wheel diameter 20in.

MILLING MACHINES

New **VICTORIA** U.2 Universal and V. Vertical Milling Machines.
EDGWICK 18in. Horizontal Plain Production Milling Machine, with 40in. × 12in. table.
BROWN & SHARPE Model 2B Plain Horizontal Milling Machine, 47in. × 11$\frac{11}{16}$in. table.
ARCHDALE 28in. Plain Horizontal Milling Machine with rapid traverse, power longitudinal feed to table.
EDGWICK No. 2 Dial Type Vertical Milling Machine, 46in. × 11in. table.

PLANING MACHINE

SWIFT SUMMERSKILL 8ft. × 3ft. 6in. × 3ft. Planing Machine with 4 toolboxes, all electric Lancashire Drive.

POWER HAMMER

MASSEY 5 cwt. Pneumatic Slide Type Power Hammer.

PRESS BRAKE

RUSHWORTH 6ft. 0in. × ⅛in. 75-ton Press Brake.

SLOTTING MACHINES

BUTLER 14in. stroke All Geared Slotting Machine with 39in. diameter rotary table.
DUTRANNOIT 24in. stroke Precision Slotting Machine with swivelling head, 39⅜in. table.

SHAPING MACHINES

BUTLER 12in. Heavy Duty Shaping Machine with swivelling table.
BUTLER 18in. Heavy Duty Shaping Machine.

SHEARING MACHINE

New **KEETONA** 8ft. 0in. × ⅛in. Undercrank Guillotine Shearing Machine.

All the above machines are motorised 400-440/3/50 cycles.

JOHN CASHMORE LTD.
NEWPORT 1, MON.
Tel. Newport 66941 (6 lines).

FOR DELIVERY FROM STOCK, IN TRANSIT OR LEAVING WORKS WITHIN 8 WEEKS

MACHINE TOOLS

LATHES

Centres: 6in. by 32in. Heavy.
6in. by 40in. Light.
7in. by 40in. Medium.
6in. by 32in. Medium.
7in. by 40in. Light.
8in. by 40in. Light.
6in. by 32in. Medium Hydr. Copying.
7in. by 60in. Medium.
10in. by 60in. Medium.
8in. by 60in. Medium Hydr. Copying.
8½in. by 60in. Heavy Hydr. Copying.
12½in. by 80in. Heavy.
8in. by 60in. Medium.
10in. by 60in. Medium Hydr. Copying.

CAPSTAN LATHES

1¼in. Bar Capacity.

PLAIN MILLING MACHINES

Table 25in. by 6½in.

UNIVERSAL MILLING MACHINES

Table: 40in. by 11in. Light 1 Auto Feed.
41in. by 11in. 1 Auto Feed.
41in. by 11in. 3 Auto Feeds.
47in. by 10in. Medium All Auto Feeds.
47in. by 10in. Medium, Rapid Traverse.
67in. by 12½in. Heavy Rapid Traverse.

TURRET MILLING MACHINES

Table: 36in. by 10in.
28in. by 6in.
40in. by 10in. Combined Universal.

TOOLROOM UNIVERSAL MILLING MACHINES

Table: 28½in. by 10in.
Cap. 20in. by 16in. by 10in.
Cap. 26in. by 18in. by 12in.

HAND LEVER MILLING MACHINES

Table: 14in. by 5in.
16in. by 5in.

DRILLING MACHINES

Max. Cap.: ¼in. by 18,000 r.p.m. Bench.
½in. by 9,000 r.p.m. Bench.
⅜in. by 9,000 r.p.m. Bench.
⅝in. by 3,000 r.p.m. Floor Rise and Fall Table.
9/16in. by 4,000 r.p.m. Floor Rise and Fall Table, 3 spindle.
9/16in. by 4,000 r.p.m. Bench.
¼in. Bench.
⅜in. Bench.
1½in. Pillar, Hand Worm Feed.
1¼in. Pillar, Auto Feed.
1½in. Pillar, Auto Feed.
1⅜in. Box Column, Auto Feed Rise and Fall Head.
1⅜in. Pillar, Auto Feed.
2in. Pillar, Auto Feed.
3in. Pillar, Auto Feed.

RADIALS

3ft. by 1¼in.

JIG BORER

Table: 31½in. by 17¾in.

GRINDING MACHINES

Surface—Horizontal Spindle—
24in. by 8in. Hydraulic.
Surface—Vertical Spindle—
48in. by 11½in. 11¾in. by 6in. Bench.
11¾in. by 6¾in. Floor.
Universal—
9½in. dia. Magnetic Table, Floor.
Cap. 9½in. by 40in.
Cap.: 14in. by 24in.
Surface—Table Type—
Internal: 6in. bore.
12in. wheel, Table 40in. by 20in.
Tool—Double Ended—
Wheels: 10in. by 1in. Floor.
12in. by 1½in. Floor.
14in. by 2in. Floor.

SHAPING MACHINES

16in. stroke, Swivel Table.
16in. stroke, Swivel Table, Tool Lifter.
18in. stroke, Swivel Table, Tool Lifter.
19in. stroke, Swivel Table, Tool Lifter.
20in. stroke, Swivel Table, Tool Lifter and Auto Down Feed.
22in. stroke, Swivel Table, Tool Lifter and Auto Down Feed.
24in. stroke, Swivel Table, Tool Lifter and Auto Down Feed.
25in. stroke, Swivel Table, Tool Lifter and Auto Down Feed.
29in. stroke, Swivel Table, Tool Lifter and Auto Down Feed. Rapid Traverse.

FILING AND SAWING MACHINES

Table: 11½in. by 11½in.
Stroke: 1¾in.—5in.
Throat: 6½in.

BANDSAWING AND FILING MACHINES

15in. throat 65–197 ft./min.
23in. throat 65–6,500 ft./min.
35in. throat 50–4,900 ft./min.

HACKSAWING MACHINES

Capacity: 8in. No Auto Lift.
8½in. Auto Lift.
10in. Auto Lift.

RIVETING MACHINES

⅛in. capacity.

CENTRING MACHINES

4in. capacity.

HORIZONTAL BORING MACHINES

2⅜in. Spindle.
3⅛in. Spindle.

DIVIDING HEADS

Centre Height: 3½in. Universal.
4¾in. Universal.
5½in. Universal.
7½in. Universal.
9⅜in. Universal.

CIRCULAR MILLING TABLES

Diameter: 11¾in. Hand Operated.
15¾in. Hand Operated.
15¾in. Motorised.
19½in. Hand Operated.

SHEET METAL WORKING MACHINERY

PRESSES

3-Ton Bench, Fixed Stroke, 180 s.p.m.
4-Ton Adjustable Stroke, 140 s.p.m.
4-Ton Floor, Adjustable Stroke, 140 s.p.m.
4-Ton (Deep Throat) Adjustable Stroke, 140 s.p.m.
5-Ton Bench, Adjustable Stroke.
6-Ton Bench, Fixed Stroke, 180 s.p.m.
20-Ton Ungeared Adjustable Stroke.
30-Ton Ungeared Adjustable Stroke.

UNIVERSAL POWER PUNCHING AND SHEARING MACHINES

⅜in. Plate Shearing.
½in. Plate Shearing.

BENDING ROLLS

80in. by ¼in. Power.
40in. by 16g. Hand.
40in. by ⅛in. Hand.

HAND LEVER SHEARS

Various.

ROD CUTTER

Various.

CURVE CUTTING PLATE SHEARS

4in. Blade by 3/16 Sheet.
5½in. Blade by 3/16 Sheet.

CIRCLE CUTTING MACHINES

3½in. by 40in. by 14g. Hand.
4¾in. by 40in. by ⅛in. Power.

UNIVERSAL FOLDING MACHINES

80in. by 14g. Hand.

GUILLOTINE

80in. by 14g. Undercrank.

THE TIMES MACHINERY COMPANY LIMITED

POYLE ROAD · COLNBROOK · SLOUGH · BUCKS

Phone: COLNBROOK 2442/3/4 *Grams:* Timachine, Colnbrook, Slough *Cables:* Timachine, Colnbrook, Slough

Classified Advertisements (*PLANT FOR SALE, contd.*)

RING BELLS *for machine tools*

LEEDS 63-7398

BIERNATSKI Swivel Head Vertical Miller. Model F.S.2A. Table 55in. by 14in. Long. traverse 36in. Quick power all ways to table. 18 speeds 29-1,500 r.p.m. M.D. 400/3/50.

BETTS 12in. Production Slotter. Stroke 12in. 4 ram speeds 5–62 cycles per min. Graduated T-slotted circular table 29½in. dia. M.D. 420/3/50.

NEWEY 14in. Crank Shaper. Table 14in. by 10in. M.D. 400/3/50.

SAMSON Punch, Shear, Notch and Angle Crop Machine. Shearing cap. 7/16in.; punching through ⅜in. M.D. 400/3/50.

KENDALL & GENT C.V.M.25 Vertical Miller. Kneeless type. Table 66in. by 19in.; traverse 54in. 18 speeds 15–840 r.p.m.

PLANERS LTD. Double Sided Horizontal Planer. Table 8ft. by 2ft. 2in. Admits between sides 2ft. 6in. and under toolboxes 2ft. 6in. approx. Two toolboxes on cross-beam. Rack and pinion drive to table. V-bed.

WELLS No. 50 Eccentric Power Presses. Tonnage rating 5. Adjustable stroke up to 2in. max. M.D. 400/3/50.

CINCINNATI No. 2 Dial Type Horizontal Miller. Speeds 20–500 r.p.m. Table 44in. by 12½in. Dual controls. Quick power all ways. M.D. 400/3/50.

BROWN & SHARPE 2B Plain Miller. Table size 51¾in. by 11½in. Rapid power feeds 3 ways. 16 speeds 30–1,200 r.p.m. M.D. 400/3/50.

GRAHAM & NORMANTON Gap-bed 8½in. S.S. & S.C. Lathe. Swing over flat bed 17½in. dia.; over cross-slide 10in. dia.; in gap 35½in. dia.; between centres 5ft. 18 speeds 9–460 r.p.m. M.D. 400/3/50.

MITCHELL (NEW) 8½in. Gap-bed S.S. & S.C. Lathe. Model D.M.8. Admits 4ft. 4in. between centres and 32in. in gap. Spindle bore 3½in. M.D. 400/3/50.

HUNT Model 1A Twist Drill Grinder. Cap. ⅛in.-1in.; main wheel 8in. by 1in., thinning wheel 4in. by ½in. M.D. 400/3/50.

JONES & LAMSON T.G. 1245. Thread Grinder. Admits work up to 21in. dia. and 45in. length. M.D. 400/3/50.

PRECIMAX Vertical Spindle Surface Grinder. Cap. 16in. by 48in. With 18in. segmental wheel. Magnetic chuck 15in. by 48in. M.D. 400/3/50.

NORTON type C 10in. by 48in. Hydraulic Plain Grinder. Filmatic bearings. M.D. 400/3/50.

EDWARDS 9ft. by 16's gauge Folding Machine.

RICHARDS PRN2] Horizontal Borer. Standard type. With 20in. facing head and non-traversing spindle. Main table 42in. by 30in.; top table 36in. square. Spindle to end stay 6ft. Max. distance spindle to top table 40in. M.D. 400/3/50.

UNION (NEW) G.14 and G.15 Double Ended Grinders. Wheels 14in. by 2in. (In stock.)

H. BELL (Machine Tools) LTD., Walter Street, LEEDS 4.

Kitchen & Wade H.4 Horizontal Drilling and Tapping Machine. Travelling Column Type with Square Indexing Table on Traversing Base.—Further details from:—

C. & G. OLDFIELD, LTD.,
15, Abercorn Street,
PAISLEY.

Churchill-Redman 12in. × 40in. Semi-Automatic Hydraulic Profiling Lathe. Hydraulic chuck and tailstock. Front profiling slide, rear facing slide, 15 h.p., two-speed motor. Post-war machine. Excellent condition. —LEE & HUNT, LTD., Crocus Street, Nottingham. Tel.: 84246.

ASQUITH Two-Spindle Profile Milling Machine, independent motor drive to each spindle, 415/3/50, table W.S. 18in. × 15in. Range of speeds 250 to 3,000 r.p.m.

ARCHDALE Swivel Head Vertical Milling Machine, 415/3/50. Table W.S. 36in. × 10in.

TRIDENT Model V.O. Swivel Head Vertical Milling Machine, 415/3/50. Table W.S. 30in. × 8in.

R. V. Gray.

4/6, Minerva Road, Park Royal,
London, N.W.10
Telephone: ELGar 4841/4842

Harry Kirk

can recommend the following modern quality machines from STOCK

AUTOMATICS

BULLARD 8in. Mult-au-Matic, 6 spindles, type D.

RYDER Verticalauto, capacity 16in., swing × 8in., 6 spindles.

BORING MACHINES

RICHARDS 36in. Vertical Boring Mill, complete with side head.

JONES 6in. Spindle Horizontal Borer. Table 17ft. 6in. × 8ft. Spindle travel 48in. Rapid traverse 84in. per min. Motorised 400/3/50. Weight 70 tons.

SCHARMANN 3in. Sliding Spindle Horizontal Boring Machine, equipped with facing head and screwcutting.

BULLARD 36in. Vertical Boring Mill.

KITCHEN & WADE Vertical Fine Boring Machine, 14in. stroke. Compound table.

SCHIESS Vertical Boring Mill, 39in. dia. of table. Maximum swing 48in. S.C.M.D. 35 h.p., 400/3/50.

DRILLING MACHINES

POLLARD Model 3KX 3ft. Radial Drilling Machine.

GRINDING MACHINES

BROWN & SHARPE 6in. × 18in. Horizontal Spindle Surface Grinding Machine complete with magnetic Chuck and Dust Extractor.

PRECIMAX Universal Grinder, capacity 12in. × 72in.

HEALD No. 172 Gap Bed Internal Grinding Machine, maximum diameter of component 36in.

BILLETER Hydraulic Open-side Slideway Grinding Machine, capacity 47in. × 12in.

LATHES

NOBLE & LUND Heavy Duty Centre Lathe, 22in. centre height × 29ft. between centres. Max. swing over saddle 33in. dia.

HARVEY Heavy Duty Centre Lathe, 42½in. centre height × 52ft. between centres. Max. swing over saddles 65in. dia.

CHURCHILL-REDMAN S.S. & S.C. Centre Lathe, 7½in. centre height × 4ft. 6in. between centres.

DENHAM S.S. & S.C. Gap Bed Centre Lathe, 15½in. centre height × 12ft. 6in. between centres. Swing 54in. in gap, complete with Taper Turning Attachment, Faceplate, Chucks, etc.

CRAVEN S.S. & S.C. Centre Lathe, 13½in. centre height × 65ft. between centres.

CRAVEN S.S. & S.C. Centre Lathe, 13½in. centre height × 31ft. 6in. between centres.

WERMELINGER Centre Lathe, Model MJ8, 6in. centre height × 32in. between centres.

HERBERT No. 11 Combination Turret Lathe.

MILLING MACHINES

BROWN & SHARPE No. 3 Vertical Milling Machine.

ARCHDALE 30in. Vertical Milling Machine.

COLLET & ENGLEHARDT Keller Type Die Sinking Machine. Model FKf 80, capacity 60in. × 30in.

PLANING MACHINES

ORMEROD 24in. Heavy Duty Shaping Machine.

CLEVELAND Openside Planing Machine, capacity 10ft. × 2ft. 6in.

CINCINNATI Planing Machine, capacity 8ft. × 2ft. 6in.

MISCELLANEOUS MACHINES

BUTLER 18in. Stroke Slotting Machine.

SUNDERLAND No. 11 Gear Planer. Max. capacity 74in. dia. Max. stroke 9in. face. S.C.M.D. 400-440/3/50.

CLIFTON & BAIRD Cold Circular Saw.

Hydraulic Vertical Internal Honing Machine (manufactured by **PETER WOLTERS**). Capacity 0.2in. to 2in.

RAPIDAN Double Helical Gear Generating Machine, 12in. diameter capacity.

Further details from

HARRY KIRK ENGINEERING LTD.,
BRANDON ROAD WORKS, BRANDON ROAD, COVENTRY
'Phone:
WALSGRAVE-ON-SOWE 2253 (6 lines)

Reed Prentice No. 6 Large Verti- cal Milling Machine. Table 84in. × 20in. 3½in. tee slots. Table traverse long. 72in. Table traverse trans 24in. Power feeds and rapid feeds, spindle speeds 15 to 500 r.p.m. Spindle traverse 12in., head traverse 24in. Throat clearance 28in., daylight max. 38in., min. 2in. Seen London area.—BOX C558, MACHINERY, Clifton House, Euston Road, N.W.1.

1,000 Ton 'Eumuco' Knuckle Joint Coining and Sizing Press, steel plate construction, 2in. stroke, 31in. between sides with 40 h.p. motor drive.

REED BROTHERS (ENGINEERING) LTD.,
Replant Works,
Woolwich Industrial Estate,
London, S.E.18.
Tel.: Woolwich 7611 (6 lines).

Kearns No. 2 Horiz. Boring and Facing Machine, travelling spindle 2⁷⁄₁₆in. dia., facing head 20in. dia., will face up to 30in. dia., main tee slotted table 48in. × 30in., top tee slotted table 36in. × 36in., max. distance facing head to outer support 72in., 12 speeds to spindle, 8 feeds to facing head, both top speeds approx. 200 r.p.m., 8 feeds from 8-96 c.p.i., main drive through vee belt from 10 h.p. 400-440/3/50 motor, complete with Star Delta Starter.

GRIBBEN-DAVIES (MACHINE TOOLS),
Turner Street, Suffolk Road,
SHEFFIELD, 1.
Tel.: 24036 and 23870.

Classified Advertisements (*PLANT FOR SALE, contd.*)

Classified Advertisements (*PLANT FOR SALE, contd.*)

PIDGEN BROS. LIMITED

HELMET ROW, OLD STREET, LONDON, E.C.1

Telephone: CLErkenwell 6481

ALL MACHINES MOTORISED FOR 3 PHASE SUPPLY UNLESS OTHERWISE STATED

BORERS (Horizontal)
KEARNS No. 2.

BROACHING
AMERICAN Model H2, stroke 30in.

CAPSTANS
MINGANTI 20/40P 1 9/16 cap. Bar feed.
GISHOLT IL Turret.

DRILLS
CORONA No. 21 AR No. 3 M.T.
ARCHDALE 28in. Prod. Four speeds.
CORONA 36in. Radial 12N.
CORONA 15AX 1½ capacity.
JONES & SHIPMAN 816, 5/16in. cap.
CORONA 1AX No. 1 Morse Taper.
CORONA 15 HF, 5/16in. cap.
PEGARD 3ft. 6in. Radial.
LELAND GIFFORD 2-sp., No. 2 M.T.
HERBERT Type B. Single Spindle, ½in.
STEINEL Cluster Type.
CORONA 6MX Cluster Type.
HERBERT Type H, ½in. cap.
ARCHDALE 21in. Production.
CORONA 12AX, 5/16in. cap.

ENGRAVERS
LIENHARD 3 Dimensional.
LIENHARD No. 1H and 2.
T.T. & H. 3DS Three Dimensional.
HUPFIELD Router.
T.T. & H. Type C, C.B. and M.A.

FILING AND SAWING MACHINES
WICKSTEAD No. 1 Hacksaw.
RAPIDOR 6in. Hacksaw.
RAPIDOR Filing.

FOLDERS
Sheet Edging, 30in. × 22g.

GEAR CUTTERS
SAFAG Pinion
MAXICUT 7in. × 2in. × 6 D.P.
FELLOWS "Hourglass."
PETERMAN No. 1 and 2.

GRINDERS (Surface)
HEALD 25in. Ring.
CHURCHILL OSB 8in. × 30in.
EXCEL No. 2 14 × 6 hand.
LUMSDEN Vert. 210 XXM.
SNOW Table 20in.
ABRASIVE No. 34 Vertical Spindle.
ABRASIVE 3B, 24in. × 8in.
ABRASIVE No. 1½in. hand.

GRINDERS (Internal)
BRYANT 16/38.
NEWALL Model KN.

GRINDERS (Cylindrical)
NEWALL 10 × 24 hyd.
COVENTRY GAUGE 6in. × 12in.
CHURCHILL 7 × 36in.
CHURCHILL PBH 12 × 36in. Uni.
NEWALL 6 × 18.
FRANCIS 6 × 7.
PRECIMAX MPB 10 × 48.

GRINDERS (Miscellaneous)
B. & S. No. 13 Universal.
J. & S. Drill, ⅛ to ⅞.
STEDALL WUNDERLI Carbide.
TAUCO 10in. Abrasive Cut off.
ROWLAND 12in. × 2in. Single Wheel.
ABWOOD Carbide.
WICKMAN NIVEN Carbide.
WADKIN Saw Sharpener.
TURNER T. & C.
UNION G14 D.E. Tool, 14in. × 2in. wheel.
BLACK DIAMOND No. 2 Drill.
JACKMAN D/E 18in. Disc.
EXCEL Model OS, T. & C.
TURNER 14/20 20in. × 3½in. wheels C/E.
MATRIX No. 10 × 10in. Plain Thread.
NEWALL 420 Univ. Thread for taps.
HUNT No. 0 and 1 Tap Regrinders.
HUNT No. 0 and 2 Drill.

KEYSEATERS
BENTLEY 5in.
ASQUITH H.K.O. Horiz. Duplex.
EDGWICK 4in.

LATHES
SMART & BROWN Model M.SS and SC.
HARRISON 4½in. S.S. & S.C.
COLCHESTER TRIUMPH 7in. S.S. & S.C.
SWIFT 12 SV5, facing and boring.
PRATT & WHITNEY 12in. × 30in. S.S. & S.C.
MONARCH 10EE × 22in., S.S. & S.C.
SMALLPIECE 12in. × 20in. Multi-tool.
LORCH A11 Precision.
DENHAM 5in. S.S. & S.C.
RIVETT 3½in. Plain. Model 715.
WARD, HAGGAS & SMITH 8½in. × 78in.
COULTHURST Surfacing and Boring.
RYDERMATIC No. 12 Multi Tool.

MILLERS (Horizontal)
DENBIGH Type C4.
ROSCHER EICHLER, Table 39in. × 12in.
SUNDSTRAND No. 0 Production.
PALLAS LM, Table 30in. × 7in.
ST. ANDREA Model UFO3.
ADCOCK & SHIPLEY Model OCD.
KENT OWEN 1/8 and 1/14 Production.
HARDINGE Precision.
WERNER. Table 14 × 5.
JONES 225 Univ. Table 22 × 6.
ARCHDALE 28in. and 20in.

MILLERS (Vertical)
C.V.A. 79 Tool and Die.
PALLAS VI. Table 30 × 8½.
REED PRENTICE No. 5, 68in. × 16in. table.
MILNE. Table 30in. × 8in.
WADKIN Type LXIA. Table 36in. × 13in.

PRESSES (Hand)
STANELCO Toggle.
APEX Treadle.
NORTON No. 4.

PRESSES (Power)
LECRA No. 8. 4 tons.
GERMAN Rotary Punch.
WRIGHT Clicking Press.
SCHULER VZZ, 15 tons d/s gripper feed.

PROFILING MACHINE
CURDNUBE 2 Spindle. Model KIV.

RIVETERS
HIGH SPEED Hammer, 7/16 cap.
TURNER RH 18 (⅛in.) RH38 (⅜in.) and RH34 (¾in.).
TURNER RH 14/12 (¼in.) RS6 (⅜in.).

SCREWING MACHINE
ATLAS No. 2, 3in.-6in. (Unused.)

SHAPERS
INVICTA 24in.
NEWEY 14in.

SLOTTERS
EDGWICK
BENTLEY 4in.

TAPPERS
ESSEX No. 124, ¼in. cap and No. 24.
THIEL No. 4, ⅛-9/32nds.
ACE Horiz., ½in. capacity.
HASKINS Type 3 C.A.M., ¼in. cap.
J & S Electrotap, ¼in.

THREAD MILLERS
JONES FBI 4ft. between centres.

Willison 8½in. Lathe, 6ft. 0in. between Centres, new 1953. Complete Equipment, Motor, etc.
Further details from:—
C. & G. OLDFIELD, LTD.,
15, Abercorn Street,
PAISLEY.

Lang Heavy Duty Boring and Facing Lathe, 14in. swing × 54in. between centres. Speeds 19 to 900 r.p.m. Feeds 36 to 432 c.p.i. Hole in spindle 1⅜in. dia. £200 ex works O.N.O. London area.—BOX C575, MACHINERY, Clifton House, Euston Road, N.W.1.

Worthington Simpson 2-stage Air Compressor. Air cooled, size 100. Brooks Motor 21-h.p. 400-440/3/50. Syn. speed 1,000 r.p.m. and Receiver.—BOX C587, MACHINERY, Clifton House, Euston Road, N.W.1.

No. 16 Herbert Vertical Milling Machine. Table 55in. × 13½in. Long. traverse 34in. 16 speeds 16-427 r.p.m. S.C. motor.

No. 2 Edgwick Vertical Milling Machine, with power operated rotary table. Table 46in. × 11in., long. traverse 26in. Spindle bored No. 40 S.M.T., 5 h.p., 400/3/50 motor, 9 speeds 37-605 r.p.m.—LEE & HUNT, LTD., Crocus Street, Nottingham. Tel.: 84246.

Coulthurst 9½in. All Geared Head Surfacing and Boring Lathe. 400/3/50.—HICKS MACHINERY, LTD., 26, Addison Place, London, W.11. Tel.: PARk 2333.

NEW MACHINE TOOLS FROM STOCK

GRANOR OF HALIFAX 28in. stroke Heavy Duty Shaping Machine. 400-440/3/50.

EARLY DELIVERY

MITCHELL OF KEIGHLEY 8½in. Type DM8 Gap Bed Lathe, by 5ft. 3in. B.C. 400-440/3/50. January, 1961 delivery.
MITCHELL OF KEIGHLEY 10½in. Type DM10 Gap Bed Lathe by 5ft. 5in. between centres. 400-440/3/50. December delivery.
MITCHELL OF KEIGHLEY 12½in. Type DM12 Gap Bed Lathe by 6ft. 9in. B.C. 400-440/3/50. April delivery.
VICTORIA No. 2 Rapidmil Universal Milling Machine, table size 48in. × 11½in. 400-440/3/50. December delivery.
VICTORIA No. V2 Vertical Milling Machine. Table size 45in. × 11in. 400-440/3/50. Instant delivery.

CENTAUR TOOL WORKS,
EYRE STREET, SPRING HILL,
BIRMINGHAM, 18

Tel.: EDGbaston 1118 & 1119 'Grams: Capstan, Birmingham

VICTORIA U.3 Universal Milling Machine, 415/3/50, table W.S. 60in. × 12½in. With Dividing Heads and Vertical Milling Attachment.

THREE—28in. **ARCHDALE** Plain Horizontal Milling Machines, 415/3/50. Table W.S. 49in. × 10in.

R. V. Gray.

4/6, Minerva Road, Park Royal,
London, N.W.10
Telephone: ELGar 4841/4842

Ormerod 16in. Double Headed Heavy Duty High Speed Shaper, length of stroke 16in., length of bed 10ft. 0in., width of bed 1ft. 9in., depth of bed 2ft. 10in., feed of toolbox 6in., max. section of tools in toolholder 1½in. × 1½in., traverse of each headstock 5ft. 0in., 12 feeds to headstock 0.01in. to 120in., max. distance between tools 6ft. 6in., min. 1ft. 6in., two tables supplied, 9 speeds to ram, ram strokes per min. 11 to 120, 1952 machine, almost new condition.

GRIBBEN-DAVIES (MACHINE TOOLS),
Turner Street, Suffolk Road,
SHEFFIELD, 1.
Tel.: 24036 and 23870.

Classified Advertisements (*PLANT FOR SALE, contd.*)

Classified Advertisements (*PLANT FOR SALE, contd.*)

Classified Advertisements (*PLANT FOR SALE, contd.*)

Modern Machine Tools Ltd

QUALITY USED MACHINE TOOLS IN STOCK

GRINDING MACHINES

HEALD 72A-3 Internal Grinder.
LUMSDEN 70 RXXO Cup Wheel Grinder.
LANDIS 10in. by 18in. Plain Hydraulic Plunge Type Grinder.

LATHES

GRANOR 6½in. Centre Lathe. 40in. between centres. 2in. spindle bore. Speeds (8) 15-355 r.p.m. Straight Bed.
OLDFIELD & SCHOFIELD 7½in. Centre Lathe. 42in. between centres. Speeds 10-382 r.p.m. Straight Bed.
LANG 9½in. Centre Lathe. 48in. between centres. 2½in. spindle bore. Speeds 19-900 r.p.m. Straight Bed.

MILLING MACHINES

ARCHDALE 28in. Horizontal Mill. Speeds (6) 30-462 r.p.m. Table 38½in. by 13in. Power Feeds.
VAN NORMAN Horizontal Mill. Speeds (18) 25-1,250 r.p.m. Table 50in. by 12in. Power Feeds.
CINCINNATI 2 MH Mill. Speeds (15) 23-1,200 r.p.m. Table 44½in. by 10½in. Power Feeds.
WANDERER Vertical Mill. Speeds (16) 29-1,200 r.p.m. Table 39in. by 10in. Power Feeds.

NEW MACHINES IN STOCK OR FOR EARLY DELIVERY

MYFORD MG.12 Grinders.
PROGRESS ½in., ¾in., 1¼in. and 2in. Drilling Machines.
RAPIDOR 6in. Hacksaws.
VICTORIA U.2 and U.2 Rapidmil and V.2 Millers.
MITCHELL 8½in. and 12½in. Lathes.
ELLIOTT 7½in. Centre Lathes.
ARNO Millers.
BEAVER Millers.
COLCHESTER Chipmaster, Student and Triumph Lathes.
SMART & BROWN "A", "M" and "1024" Lathes and H.3 and H.5 Toggle Presses.
TOWN A.E.4 and A.E.5 3ft. 6in. and 4ft. 6in. Radial Drills.

P.O. BOX No. 56 GOSFORD STREET COVENTRY Telephone: COVENTRY 22132-6 Cables: MODERN COVENTRY

SM/MMT 6320/A

TWW

14½in. centres **WARD, HAGGAS & SMITH** S.S. & S.C. Lathe, 25ft. 6in. flat gap bed, 19ft. 6in. between, 4½in. hollow spindle, standard 3-phase electrics.
12½in. centres **SWIFT** S.S. & S.C. Lathe, 12ft. 6in. gap bed, 6ft. 9in. between centres, 4¼in. hollow spindle, standard 3-phase electrics.
10½in. centres **WILLSON** S.S. & S.C. Lathe, 10ft. 0in. gap bed, 5ft. 6in. between, 4½in. hollow spindle, single pulley drive.
10½in. centres **DEAN, SMITH & GRACE** S.S. & S.C. Lathe, 8ft. 0in. gap bed, 4ft. 0in. between, 2in. hollow spindle, standard 3-phase electrics.
10½in. centres **LANG** S.S. & S.C. Lathe, 14ft. 0in. straight bed, admit 8ft. 0in. between, 2⅛in. hollow spindle, single pulley drive.
7in. centres **STANLEY** S.S. & S.C. Lathe, 6ft. flat gap bed, 3ft. between, 2⅛in. hollow spindle, standard 3-phase electrics.
5½in. centres **LITTLE JOHN** S.S. & S.C. Lathe, straight beds with hardened slideways, 24in. between 1 1/32in. hollow spindle, electrics 220/230 single phase.

NEW LATHES

16½in. centres **MITCHELL OF KEIGHLEY** type "O.M.16" motor drive S.S. & S.C. Lathe, 18ft. 0in. gap bed, 11ft. 3in. between centres, 4½in. hole in spindle, standard 3-phase electrics.
14½in. centres **MITCHELL OF KEIGHLEY** type "O.M.14" motor drive. S.S. & S.C. Lathe, 16ft. 0in. gap bed, 9ft. 9in. between centres, 4½in. hole in spindle, standard 3-phase electrics.
10½in. centres **MITCHELL OF KEIGHLEY** type "O.M.10" motor driven S.S. & S.C. Lathe, 12ft. 0in. gap bed, 7ft. 5in. between centres, 3⅝in. hole in spindle, standard 3-phase electrics.

THOs. W. WARD LTD.
ALBION WORKS · SHEFFIELD
'Phone 26311. Ext. 345.

Remember - WARDS might have it!

DEREK HARTLE LIMITED

FOR HIGH CLASS MACHINE TOOLS

CINCINNATI 36-168 Vertical Hydrotel Milling Machine.

In practically new condition, arranged for motor drive and complete with all electrical equipment. Table working surface 36in. by 192in. Machine has 24 spindle speeds from 12-1200 r.p.m. and is driven by a 50 H.P. spindle drive motor. Complete with a 360 degree tracer unit. Serial No. 48M459733-1.

'OUTSTANDING VALUE'

FREE DELIVERY ANYWHERE IN UNITED KINGDOM

COWHILL LANE, ASHTON-UNDER-LYNE, LANCS.
Phone: ASHton 3631/2. Grams: "HARTOOLS" Ashton-U-Lyne

HELLER FV120 VERTICAL HYDRAULIC MILLING MACHINE, Table 55in. × 15¾in. Long. travel 43in. 30 h.p. Main motor. Rapid and Power Trav. all directions. 18 speeds, 30/1,500 r.p.m. Excellent condition. £2,300.

BOX C572, MACHINERY,
Clifton House, Euston Road, N.W.1.

Edgwick Vertical Keyseating Machine. 4¼in. stroke, throat 8½in., max. daylight 15in. to 3in. Table 32in. × 9in. 5½in. cross slide traverse, 16in. table traverse, 6 spindle speeds, collet holders and collets, 1½ h.p. motor, 400-440/3/50. 690-1,440 r.p.m. Switchgear complete.—BOX C561, MACHINERY, Clifton House, Euston Road, N.W.1.

Asquith 8ft. OD2G Radial Drill, 3 motor type, Serial No. 12776, 12 speeds 42-1130, cast iron 5in., steel 6in., brass 6in. hole, 4 feeds, 38, 58, 83, 120 c.p.i., electrics suds pump and starter, loose box table.

GRIBBEN-DAVIES (MACHINE TOOLS),
Turner Street, Suffolk Road,
SHEFFIELD, 1.
Tel.: 24036 and 23870.

Rockford 28in. Hydraulic Shaping Machine with universal table. Rebuilt to fine tolerances by highly skilled craftsmen. Seen London area.—BOX C559, MACHINERY, Clifton House, Euston Road, N.W.1.

Classified Advertisements (*PLANT FOR SALE, contd.*)

F. J. Edwards Ltd.

DRILLING MACHINES

CINCINNATI BICKFORD 36in. Radial Drilling Machine, spindle No. 4 M.T.
SEGIC (Swedish) 27in. Radial Drilling Machine, 1¼in. capacity, speed 80-890 r.p.m. (New.)
LELAND GIFFORD 3-spindle Drilling Machine, mounted on 4-spindle base. Spindles No. 3 M.T., one spindle with power feed, pole change motors, 8 spindle speeds 165-1,500 r.p.m.
ARCHDALE No. 2240 28in. production type Drilling Machines, capacity in mild steel 3in. dia.
ADCOCK & SHIPLEY 28in. No. 11A Drilling Machine, 2in. capacity.

ENGRAVING MACHINES

TAYLOR, TAYLOR & HOBSON Model D Engraving Machines. (New.)
TAYLOR, TAYLOR & HOBSON Model A Bench Engraving Machine. (New.)
T.M.A. Model G2 Engraving Machine, pantograph reductions 1 : 1-7 : 1.

FILING AND SAWING MACHINES

CRYPTO Horizontal Bandsawing Machine.
WELLS Horizontal Bandsawing Machine, 16in. × 5in. capacity.
GROB Model A3 Band Filing Machine, table 23in. × 17in.
RAPIDOR motorised Filing and Sawing Machine. Table 15in. × 15in.

GRINDING MACHINES

CHURCHILL 16in. × 50in. Universal Tool and Cutter Grinder.
CHURCHILL 12in. × 36in. Hydraulic Universal Grinding Machine, with internal spindle.
PRECIMAX 12in. × 36in. model UPJ Hydraulic Universal Grinding Machine, with internal spindle.
BROWN & SHARPE 12in. × 30in. Universal Grinding Machine.
NEWALL 10in. × 48in. type LA Heavy Duty Hydraulic Plain Grinding Machines, with oscillating wheel head. Wheels 28in. × 1⅜in. 1951 machine.
OLIVETTI 13¾in. × 48in. Hydraulic Production Grinding Machines. (New.)
CINCINNATI 6in. × 18in. Model EA Hydraulic Cylindrical Grinder.
PRATT & WHITNEY 36in. × 12in. Vertical Spindle Surface Grinder.
CHURCHILL 24in. × 6in. Horizontal Spindle Surface Grinding Machine.
BROWN & SHARPE 18in. × 6in. Horizontal Surface Grinding Machine.
CHURCHILL Model E.C. Centreless Grinding Machine. Capacity 3in. dia. × 9in. long.
WRIGHT 12in. Table Surface Grinder. (New.)
HEALD No. 72 Size-Matic Duplex Hydraulic Internal Grinder, for finish grinding opposite holes.
CHURCHILL Model HBB automatic sizing traverse feed type Internal Grinding Machine, with spindles for combined hole and face grinding, max. swing 19in.
SMART & BROWN 1⅜in. cap. Internal Grinder.
COVEL 24in. × 8in. Hydraulic Horizontal Surface Grinder.
HUNT No. 3 Twist Drill Grinder, 3in. cap.
HUNT No. 1 Twist Drill Grinder, ½in. cap.
JUNG 18in. × 6in. Hydraulic Horizontal Surface Grinder.
B.S.A. No. 12-5 Centreless Grinder, 5¼in. dia. capacity.
SNOW type NC14 Horizontal Surface Grinding Machine, 12ft. stroke, with canting table for shear blades, etc., fitted with 12ft. 6in. × 8in. magnetic chuck.
JACKMAN No. 28 53in. Disc Grinder.
NORTON 36in. × 10in. horizontal spindle Production Surface Grinder.
GRAND RAPIDS No. 25 Hydraulic Surface Grinder, 18in. × 6in.
MATRIX No. 1A Universal Grinder.
NORTON 10in. × 36in. Hydraulic Plain Grinder.
BILLETER twin head Radial Arm Open Sided Hydraulic Slideway Grinder. Table 9ft. 8in. × 2ft. 3in., infinitely variable table speeds 6ft. 6in. to 38ft. per min., push button control, rapid traverses, telescopic bed covers.
BANDFACERS, 43in. × 6in. and 36in. × 4in. (New.)

359-361, EUSTON RD., LONDON, N.W.1
Telephone: EUSTON 5000. Telex No. 24264.
And at Lansdowne House, 41, Water St., Birmingham, 3. *Telephone: Central* 7606-8

Cincinnati 4/48 Duplex Hydro-matic Production Milling Machine.
LUND PRECIMAX Model MPH 10in. × 36in. Plain Cylindrical Grinder.
WARD Nos. 16, 10/13, 10B, 7B Combination Turret Lathes, covered beds. Also Ward OE Capstan Lathes.
CHURCHILL SLIDEWAY GRINDER, open-side, 35in. stroke, hydraulic. £750.
GIDDINGS & LEWIS NO. 25 RT Horizonta Borer, 2¾in. spindle, 17in. Facing Head.
ARCHDALE RADIAL DRILL, heavy duty low base and loose table.

HELIOT,
35, Greenwich Church Street, London, S.E.10

EDWARDS 8ft. × ¼in. Heavy Duty Hand Geared Folding Machine.
SEDGWICKS type C.10 Q.L. 10ft. × 3/16in. Universal Bending and Folding Machine. Motorised 415 volts, 3 phase, 50 cycles, with control gear.
EDWARDS 4ft. × 14g. Power Guillotine, 415 volts, 3 phase, 50 cycles.

R. V. Gray.

4/6, Minerva Road, Park Royal, London, N.W.10
Telephone: ELGar 4841/4842

Jones & Shipman Hydraulic Precision Universal Grinder, size 12in. × 36in. with standard equipment and internal spindle. Excellent condition.—BOX C622, MACHINERY, Clifton House, Euston Road, N.W.1.

All Geared Horizontal Borer. 400/3/50. 2¾in. traversing spindle.—HICKS MACHINERY, LTD., 26, Addison Place, London, W.11. Tel. PARk 2333.

HIGH QUALITY USED MACHINE TOOLS

COVMAC 13in. Swing Gap Bed Lathe, by 3ft. 3in. b.c. 400/3/50.
COVMAC 17in. Swing Gap Bed Lathe, by 5ft. 0in. b.c. 400/3/50.
DENHAM 6in. Gap Bed Lathe by 2ft. 3in. b.c. 400/3/50.
GRANOR OF HALIFAX 18in. × 28ft. b.c. A.G.H. Gap Bed S.S. & S.C. Lathe. 400/3/50.
D.S. & G. 7in. CH by 4ft. 0in. b.c. Straight Bed Lathe. 400/3/50.
BARDONS & OLIVER No. 3 Universal Turret Lathe. 400/3/50.
GISHOLT No. 5 Universal Turret Lathe. 400/3/50.
WARNER & SWASEY 1A Turret Lathe. 400/3/50.
KELLY 28in. Stroke Heavy Duty Shaping Machine with swivelling table. 400/3/50.
NOBLE & LUND 11in./16in. Hydraulic Cold Sawing Machine. 400/3/50.
NOBLE & LUND 20/22in. Fluifeed Cold Sawing Machine with hydraulic swivel vice. 400/3/50.
RUSSELL Saw Sharpening Machine, max. capacity 42in. diameter. 400/3/50.
BUTLER 8in. Precision Slotter. 400/3/50.
ORMEROD 12in. Slotting Machine. 400/3/50.

WE UNDERTAKE REBUILDING OF ALL TYPES OF MACHINE TOOLS

CENTAUR TOOL WORKS,
EYRE STREET, SPRING HILL, BIRMINGHAM, 18

Tel. EDGbaston 1118 & 1119 'Grams Capstan, Birmingham

MARTIN
BROTHERS (MACHINERY) LTD.

EMPRESS WORKS, EMPRESS STREET CORNBROOK, MANCHESTER, 16
Members of B.A.M.T.M.
Tel.: Trafford Park 1091-2

USED MACHINES IN STOCK AVAILABLE FOR IMMEDIATE DELIVERY

WEBSTER & BENNETT 48in. Vertical Borer.
GLEASON 18in. Bevel Gear Cutter.
CORONA Single Spindle Drill. No. 2 Morse.
B.S.A. LANDIS Plain Grinder.
SMART & BROWN 4in. × 18in. Straight Bed Lathe.
EDGWICK 6½in. × 42in. Lathe.
HERBERT No. 1 Miller.
WILSON 7½in. × 36in. S.S. & S.C. Lathe.
HERBERT " Carbicut " Lathe.
RIVET Internal Grinder.
HENDEY 16in. swing × 30in. S.S. & S.C. Lathe.
PRATT & WHITNEY Thread Miller, 4½in. × 12in.
CINCINNATI 4/36 Hydromatic Miller.
KENDALL & GENT No. 1 Vertical Miller, Table 17in. × 48in.
STAMCO 5ft. × ¼in. Deep Throat Guillotine.

NEW MACHINE TOOLS IN STOCK OR ON SHORT DELIVERY

IMMEDIATELY AVAILABLE

NEW H.M.V. 75 HORIZONTAL BORING MACHINE. 3in. travelling spindle, 18in. facing head, revolving table 40in. × 32in., rapid traverse all ways, fitted with rules and dial gauges.

GRIMSTON 1in. Capacity Bench Drill.
TOWN 4ft. 6in. Radial Drill, Type A.E.I.
ARTSON 16in. Double Ended Grinder.
MILFORD 10in. and 12in. Double Ended Grinders.
PACERA ½in., ⅜in. and ¾in. Drills.
KERRY Super 8 Bench Drill.
HARRISON 13in. S.S. & S.C. Lathe.
PILOT 12 ton Hydraulic Press.
UNION Tool and Cutter Grinder.
CARDIFF 11in. × 80in. Gap Bed S.S. & S.C. Lathe.
RAPIDOR 6in. Saw.

MACHINE TOOLS AVAILABLE FOR SALE BUT NOT IN STOCK

ASQUITH 6ft. Radial Drill.
PEGARD Kneeless Type Vertical Miller, 36in. Under Spindle, Table Travel approx. 4ft.
KEARNS Patent No. 2 High-speed Surfacing, Boring and Milling Machine. New 1959.
BUFFALO 28U Double Ended Punch, Shear and Angle Cropper.
STIRK Vertical Boring and Turning Miller, 6ft. 1in. Swing.
L.M.B. Boring and Turning Miller, 5ft. swing.
CRAVEN 16½in. × 26in. S.S. & S.C. Lathe.

MACHINES MOTORISED 400/3/50 UNLESS OTHERWISE STATED.

The above list is only a selection of the many new, used and rebuilt tools available, please call or write for our priced brochure. We will rebuild your own machine tools back to makers' specification with six months' guarantee.

Classified Advertisements (*PLANT FOR SALE, contd.*)

MIDLAND

BORING MACHINES

KEARNS No. 2 Patent Horizontal Borer. 3in. Trav. Spindle. 29in. Facing Head.

CROPPING MACHINES

Angle Cropping Machine. Cap. up to 6in. × ⅝in. angles.

DRILLING MACHINES

POLLARD 13in. Pillar Drill. No. 2 Morse Taper. R. & F. Table 11in. × 11in.

KITCHEN & WADE 12ft. Radial Drill. Spindle to base 8ft. 9in. Speeds 8-800 r.p.m.

GRINDING MACHINES

ELB 24in. × 8in. Hydraulic Surface Grinder. Non-electric mag. chuck.

LUMSDEN Double Ended Grinder. Wheels 24in. dia. × 4in. wide.

New **NORTON** 10in., 12in., 14in., 16in. and 20in. D/E. Tool Grinders.

CAPSTAN AND CENTRE LATHES

WARD 8 Combination Turret Lathe. Covered Bed. 3⅝in. H/SP.

HERBERT 9 Combination Turret Lathe.

WARD 10/13 Combination Turret Lathe. Covered Bed. 4½in. H/SP.

HENDEY 9in. S.S. & S.C. Lathe. 12 speeds 14-478 r.p.m. Taper turning 4ft. 6in. between centres.

LANG 10½in. × 5ft. S.S. & S.C. Gap Bed Lathe.

LANG 20in. C.H. × 5ft. 9in. B.C. S.S. & S.C. Lathe.

LANG 26in. Surface and Boring Lathe. Hex. turret.

HAMMERS

MASSEY 5 cwt. Slide Type Pneumatic Hammer. 400/3/50.

PLANING MACHINES

BOEHRINGER 10ft. × 3ft. × 2ft. Open-side Planing Machine. 1 toolbox on cross-rail, 1 sidebox. Electric drive and reversing.

PRESSES

BRADLEY & TURTON No. 3 Flypress.

SWEENEY & BLOCKSIDGE Bench Press. Cap. 3 tons.

SCREWING MACHINES

KENDALL & GENT 3½in. Screwing Machine. Leadscrew Type.

SHAPING MACHINES

WOTAN 27in. Stroke Hydraulic Shaper.

POLISHING MACHINES

3 and 5 h.p. Polishing Spindles.

All machines 400/3/50 electrics unless otherwise stated.

THE
MIDLAND MACHINE TOOL CO.
BRADLEY, BILSTON, STAFFS.
Tel.: Bilston 42471/9.

TATE

LATHES

LE BLOND REGAL 8in. Centre Lathe.
CROWTHORNE 10½in. by 5ft. 6in. Centre Lathe.
New **MYFORD** Super 7B Centre Lathe.

CAPSTAN AND TURRET LATHES

HERBERT No. 2 pre-optive bar turret lathe. Flamard bed 2in. bar capacity with bar feed and full turret tooling.
LIBBY 6H 8in. Spindle Turret Lathe

SHAPING & SLOTTING MACHINES

Two **ALBA** Model 4S 18in. shaping machines.
BROOK 18in. shaping machine.
KLOPP 22in. shaping machine.
TORFEX 22in. Shaper.
ALBA 6S 24 Shaper.
GSP 8in. Stroke Slotter. (Nearly New.)

SAWS

WADKIN Type MO cutting off Saw.

POWER PRESSES AND SHEET METAL

BLISS Model 20B, 27 ton Inclinable Power Press.
Three **BLISS** Model 21B 40-ton Power Presses. Adjustable Stroke with Guards. (Nearly New.)
HME Model DCP3 70-ton double-sided, double crank single action Power Press.
BENNIE 8ft. by 3/16in. Guillotine.

Three New **MULLER AMP** 22 ton Power Presses.
Three New **MULLER AMP** 35 ton Power Presses.
Two New **MULLER AMP** 45 ton Power Presses.
Two New **MULLER AMP** 50 ton Power Presses.
Two New **MULLER AMP** 80 ton Power Presses.
One New **MULLER AMP** 100 ton Power Press.
BESCO 8ft. by ¼in. Hand Geared Folding Machine.

New Address
TATE MACHINE TOOL CO. LTD.
348-354 KENSINGTON HIGH STREET
LONDON, W.14
WEStern 7031 (5 lines)

Kearns Model O.C. Horizontal Boring Machine, 8in. dia. traversing spindle. 16 spindle speeds 18-725 r.p.m. Revolving table 42in. × 36in. Spindle to steady 7ft. 6in. Verniers. 7½ h.p. 400/3/50 motor.—LEE & HUNT, LTD., Crocus Street, Nottingham. 'Phone 84246.

Churchill 12in. × 36in. Universal Grinder. Hydraulic Stroke. Internal Attachment. Complete Machine. Full details from:—
C. & G. OLDFIELD, LTD.,
15, Abercorn Street,
PAISLEY.

Herbert 15S Vertical Miller, working surface of table 49in. × 11in., 30in. longitudinal traverse, eight spindle speeds 51-700 r.p.m.
GRIBBEN-DAVIES (MACHINE TOOLS),
Turner Street, Suffolk Road,
SHEFFIELD, 1.
Tel.: 24036 and 23870.

DOUGLAS
OF HIGH WYCOMBE

SECOND-HAND MACHINES FOR IMMEDIATE DELIVERY

DRILLING MACHINES

ATLAS ½in. capacity Pedestal Drill. £25
MORRIS 3ft. 6in. Arm Radial. £80
DENBIGH 3 M.T. Pillar (unmotorised). £20

ENGRAVING MACHINE

PRATT & WHITNEY GG Type 1020 3-dim. Diesinking Machine. £2,000

LATHES AND CAPSTANS

GISHOLT No. 3 cap., with air chuck. £450
MYFORD DRUMMOND 3½in. Lathe. £35
SOUTHBEND 45in. Bench Lathe. £45
ATLAS 5in. S.S. & S.C. Lathe. £95
HALIFAX 5in. S.S. & S.C. Lathe. £110
ATLAS 8in. S.S. & S.C. Lathe, 4ft. between centres. £90
PRATT & WHITNEY 8in. Straight Bed 5ft. B.C. Lathe. £90
LITTLEJOHN 5in. S.S. & S.C. Lathe. £160
JONES & LAMSON Turret Lathe. £45
HERBERT No. 7 Combination Turret Lathe with Equipment. Reduced to £525

FILING AND SAWING MACHINES

THIEL Model III Pedestal. Reduced to £275

MILLING MACHINES

RICHMOND O3 Universal with vert. head and vert. attachment, table 48in. × 11in. £385
CINCINNATI No. 4. Vertical 68in. × 16in. £550
MINGANTI FV3M, Vert., 62in. × 15in. £1,350
ZBROJOVKA FA3V Vert., 49in. × 10in. £1,250
KEMPSMITH No. 1 Plain, 40in. × 10in. £325
KEMPSMITH No. 2 Universal, 45in. × 10in. £625
MILWAUKEE No. 2 Horizontal, 50in. × 14in. £475
PARKSON No. 2P Horizontal, 52in. × 12in. £400
MAXIMIL Fixed Head Vertical. Table size 59in. × 14in. £695
ADCOCK & SHIPLEY Thread Mill, Model 1710, 4½in. × 12in. £200

PRESSES

BESCO 7 ton Power Press, Adj. Stroke. Reduced to £100

SHEET METAL

Patent No. 1 Nibbler, 1/16in.-3/16in. cap. £55
HILMOR DB/1 Tube Bender. Reduced to £40

SUNDRIES

3-h.p. **MORRIS** Double-ended Polishing Spindle £55

WE ARE SOLE IMPORTERS OF THE FEINMESS RANGE OF CIRCULAR, PRECISION CIRCULAR, LINEAR AND PRECISION LINEAR DIVIDING MACHINES. FOR DETAILS OF MACHINES IN THIS RANGE PLEASE CONTACT US AT—

A. DOUGLAS CO., LTD.,
LINCOLN ROAD,
CRESSEX INDUSTRIAL ESTATE,
HIGH WYCOMBE, BUCKS.
Tel.: High Wycombe 4390 (5 lines).

Classified Advertisements (*PLANT FOR SALE, contd.*)

Norton Universal Grinding MACHINE. 1942. Size 12in. × 36in. Condition good. External/internal equipment.—BOX C679, MACHINERY, Clifton House, Euston Road, N.W.1.

Holbrook 8½in. × 60in. A.G.H. Centre Lathe—speeds 15 to 400—T.T. equipped.—C. DUGARD LTD., Denmark Villas, Hove 32471.

Ward Seven Turret Lathe, Com-plete chuck collets bar-feed. Motorised 400/3/50. Space wanted for smaller machines.—LYMINGTON PRECISION ENGINEERS, Gosport Street, Lymington, Hants. Lymington 2149.

B.S.A. ⅝in Single Spindle Auto-matic, Motorised, swing stop, slotting attachment, barfeed, gears, toolholders, excellent condition.—C. L. THOMAS, LTD., Stirling Road, Solihull. Tel.: 3075-6.

For Sale. Compression Plant for pressing blocks to approx. 2ft. by 1ft. by 1ft., comprising air operated hydraulic accumulator, large capacity hydraulic pump, three hydraulic presses, travelling moulds, control valves and piping.

(*a*) Charging press upstroke 15 tons capacity.
(*b*) Discharging press downstroke load 5 tons, upstroke load 30 tons.
(*c*) Block press, 800 tons capacity.

Communicate:

B. HAJJAR & SONS,
29, Minshull Street,
MANCHESTER, 1.
Tel.: Central 1608.

Schuler Bottom Slide Drawing Press. Draws up to 220 mm. depth: blanks up to 500 mm. 12 strokes per min. Table 20in. square. Flywheel drive through gearing.—BOX C586, MACHINERY, Clifton House, Euston Road, N.W.1.

Kearns Horizontal Boring Ma-chine. Model "O." Table dimensions 36in. × 36in., longitudinal traverse 40in., transverse motion 15in. Spindle bore No. 5 morse taper. Speeds 72 to 620 r.p.m. Three speed motor. Cheap to clear.—BOX C557, MACHINERY, Clifton House, Euston Road, N.W.1.

Lang Surfacing and Boring Lathe, Serial No. 34064, phosphor bronze bearings, hexagon turret, 34in. swing in gap, 10⅝in. centre height, 24in. 4-jaw chuck, swivelling compound toolrest, Norton type quick change feed box, 12 speeds 9.3-480 r.p.m., 3 reverse speeds 25, 105, 440 r.p.m., 3½in. hollow spindle, suds pump.

LANG Surfacing and Boring Lathe, Serial No. 32665, A.G.H., 17in. swing, roller bearing spindle short straight vee bed machine, with covered ways, hexagon turret on saddle with power feed to surfacing and sliding, saddle fitted with taper turning attachment, 12 spindle speeds 19-900 r.p.m., 12 feeds to turret slide 24-576 c.p.i., hollow spindle 2$\frac{3}{16}$in. dia., 16in. 4-jaw chuck, self-contained motor drive through 5-h.p. motor and starter for 375/3/50, motor mounted at rear.

GRIBBEN-DAVIES (MACHINE TOOLS),
Turner Street, Suffolk Road,
SHEFFIELD, 1.
Tel.: 24036 and 23870.

National 2½in. High Duty Forg-ing machine—air clutch.—C. DUGARD, LTD., Denmark Villas, Hove 32471.

Richmond O3 Universal Miller, Serial No. 2915, with vertical attachment and stub arbors, table 40in. × 9½in., 24in. travel, 400/3/50, 5in. Universal Dividing Head complete with chuck and two sets jaws, cutter arbor, machine vice, complete set of tools and pick-off gears. Reconditioned to Ministry Specification Unused since. Inspection invited.—R. C. KYLE, Poyle Road, Colnbrook, Bucks. Tel.: COLnbrook 2571.

Invicta 4M 18in. Shaper, Motor-ised, switchgear, 6 speeds, little used, exc. cond.—C. L. THOMAS, LTD., Stirling Road, Solihull. Tel.: 3075-6.

Birlec Belt Conveyor, Type C2. purchased 1957 (in good working order). Belt 4in. wide, height of oven aperture 3in., range 1,500 deg. C. 400/3/50.—BOX C582, MACHINERY, Clifton House, Euston Road, N.W.1.

Wickman Erodosharp Spark Erosion Machine, as new.—A. McNAMARA & CO., LTD., New Line, Bacup, Lancs. 'Phone: Bacup 946.

Ward 2A and 3A Capstans, Bar-feed, etc.—BOX C579, MACHINERY, Clifton House, Euston Road, N.W.1.

MISCELLANEOUS FOR SALE

Conveyor. For Early Disposal, 950ft. "Sovex" selective overhead chain conveyor complete with drives, trays, etc. Excellent condition. Can be inspected working Glasgow area.—BOX C523, MACHINERY, Clifton House, Euston Road, N.W.1.

TIME RECORDERS—Sales— Rental Service: Tel. Hop 2239.
TIME RECORDER SUPPLY & MAINTENANCE CO., LTD.,
157/159, Borough High Street, London, S.E.1

AUCTIONS

By Order of the E R Secretary of State for War

Messrs.
FULLER HORSEY
Sons & Cassell

have been instructed to offer for SALE by AUCTION in Lots at the ROYAL ARSENAL, WOOLWICH, LONDON, S.E.18, on **TUESDAY, 14th FEBRUARY, 1961**, and following days at 10.30 a.m. precisely each day

INDUSTRIAL EQUIPMENT AND SURPLUS STORES

including 12 "Sentinel" No. 3D SHELL TURNING LATHES; 6 "Sentinel" ROUGH TURNING LATHES; Diesel driven AIR COMPRESSOR PLANTS; Metvick-Sulzer 500 kW. DIESEL GENERATING UNIT; Diesel Electric GENERATING SETS; 570 Onan Petrol Electric Battery CHARGING SETS; Paint Spraying Compressor Plants; 21 Coventry-Climax Diesel and Petrol FORK LIFT TRUCKS, 3,500 lb. capacity; Approximately 50 VEHICLES including Austin "CHAMPS"; Austin, Bedford, Foden, Leyland and Thornycroft TRUCKS; RECOVERY VEHICLES fitted CRANES; Commer HYDRAULIC TIPPER; HEAVY DUTY TRAILERS, 10 tons to 50 tons; TRACTORS by Scammell and Thornycroft ("Antar"); 900 Gallons BOWSER TRAILERS; TRAILERS 1 ton to 5 tons; Mobile GROUND HEATING TROLLEYS, etc.; Pearns PUMPING SETS; Ransome-Rapier 6-TON PETROL ELECTRIC MOBILE CRANE; Ransome-Rapier trailer mounted 2-TON PETROL CRANE; INDUSTRIAL TRAILERS; M.T. Spares, 40 tons HARDWOOD and SOFTWOOD BATTENS AND QUARTERING; 27 tons grooved SOFTWOOD BOARDS; 7½ tons PLYWOOD SHEETS; 67,000 TWIST DRILLS; 3½ tons COUNTERSUNK ANODISED SCREWS; Tool Kits, Hand Tools, 31,000 ELECTRONIC VALVES; 420 R.C.A. Model AR88 Wireless Sets, RADIO and ELECTRICAL STORES; 3,500 pairs BINOCULARS; PRISMATIC COMPASSES; 1,300 WRIST AND POCKET WATCHES; Aircraft and other Rubber Outer Covers, Electric Cable, Scrap Batteries, miscellaneous Clothing, 20 tons old Rags and Webbing, Kitchen and Table Utensils, Furniture and numerous other effects.

Catalogues, 1s. each, admitting two persons on view days (Wednesday, Thursday, Friday and Monday preceding Sale) and one on Sale Days, may be had, when ready, from the AUCTIONEERS' OFFICES, Dept. X, 10 Lloyd's Avenue, London, E.C.3.

SITUATIONS VACANT

If you do not wish your reply to any Box No. advertisement in this section to be forwarded to certain firms, please advise us. Your reply will then be destroyed but you will not be notified as this would disclose the identity of the advertiser.

Auto Setter Required for Index and Wickman multi-spindle automatics. Peckham (London) District. Must be experienced man.—BOX C493, MACHINERY, Clifton House, Euston Road, N.W.1.

Draughtsman Detailer for Small precision press tools. Candidates are required between the ages of 20/24 years for detailing high precision power press and multi-slide press tools. They will be working under an experienced designer at an attractive salary with a company which is rapidly growing and is in the main producing large quantities of high precision pressings for the electronics industry. Modern methods of production and design are in operation. Preference will be given to those who have obtained their H.N.C. and who have had similar experience.—Applications to C. BRANDAUER & CO., LTD., 401, New John Street West, Birmingham 19. Tel.: Aston Cross 3818.

Classified Advertisements (*SITUATIONS VACANT, contd.*)

Highly Paid, Secure and Interesting posts are always available for technically trained men. Find out how you can put some letters after your name by preparing at home on "No Pass—No Fee" terms, A.M.I.Mech.E., A.M.I.Prod.E., A.M.S.E., City and Guilds, etc., etc. Full details of exams and hundreds of courses in all branches of Engineering., Draughtsmanship, Management and Automation Techniques, the benefits of our Employment Dept., and unique record of 95 per cent successes are given in "Engineering Opportunities"—a valuable 148-page Guide which will reveal many chances you are now missing.—Write for your copy today (stating subject of interest).—FREE and without obligation, B.I.E.T. (Dept. 43a), 29, Wright's Lane, London, W.8.

Assistance With Housing Could probably be given planning engineer, preferably with machine tool building estimating experience, by B. O. MORRIS, LTD., Zetland Road, Farlington, Portsmouth.

Production Foreman Required for woodworking and assembly shop. Must be active, ambitious, under 40, and able to control staff. Previous experience wood machining and bench work essential.—Write details age, experience and salary to BOX C541, MACHINERY, Clifton House, Euston Road, N.W.1.

Machine Tool Sales Engineer. Vacancy occurs on Sales Staff of well-established company, for keen man with proved selling experience and regular contacts in Midland Area. Salary, Commission, car, expenses. Application treated in confidence.—BOX C564, MACHINERY, Clifton House, Euston Road, N.W.1.

Machine Tools Sales Engineer and Correspondent required, to take charge of South Wales Machine Tool Office at Newport, Mon. Essential qualifications are a machine tool background, initiative and some commercial experience. Good working conditions. Contributory Pension scheme.—Details of age and previous experience, to: THE SECRETARY, JOHN CASHMORE LTD., Great Bridge, Tipton, Staffs. Telephone: Tipton 2181.

Manager. Macready's Metal Co. Ltd., due to expansion, require the immediate services of a Manager for their steel warehouses. Previous experience of steel warehouse procedure essential. Live energetic man of strong personality. The right salary is available for the right applicant.—Write, stating fullest details of previous experience, etc., to: THE SECRETARY, MACREADY'S METAL CO. LTD., Usaspead Corner, Pentonville Road, London, N.1.

Experienced Estimator and Rate Fixer required for Gravity Die and Shell Moulding Departments. Preferably with knowledge of Work Study.

Apply giving details of age, experience and salary required, to:

Personnel Manager,
KENT ALLOYS, LTD.,
Temple Manor Works,
Strood, Rochester,
Kent.

Tool Inspector, Preferably with A.I.D. experience required for modern factory, Croydon area. Top rate to right man.—BOX C546, MACHINERY, Clifton House, Euston Road, N.W.1.

Senior Staff Foreman for Machine and Fitting Shop required. The shop is staffed by fully skilled personnel and engaged largely in the construction of Special Purpose Machines similar to packaging or incandescent lamp making machines. Applicant must be well experienced to supervise the fitting of light machines and the milling, boring, etc., of parts for these. He should have served an engineering apprenticeship and be aged between 32 and 45 years. Housing available. Pension and Life Insurance benefit.—Write: STABILITY RADIO COMPONENTS LTD., Cranes Farm Road, Basildon, Essex.

Designer Draughtsman, Also Jig and Tool Draughtsman required by progressive machine tool firm for interesting and varied work. H.N.C. or equivalent standard essential. Apply with details of previous experience and salary. Housing assistance possible.—CENTEC MACHINE TOOLS, LTD., Centec Works, Hemel Hempstead, Herts.

CHIEF ENGINEER

required by

KENDALL & GENT LIMITED

A subsidiary of W. E. Sykes Limited

This well known and old established manufacturer of plano-milling, vertical milling, broaching and other machine tools of high repute seeks a Chief Engineer to co-ordinate and direct the design, development and other technical sections of the business.

A well paid, pensionable and permanent post is available to a suitable man who will have good opportunity to acquire increased scope and responsibility within the Sykes Group. Appointments to the Boards of Directors are usually made from within the Group.

Write in strict confidence with full details of general and technical education, qualifications, past and present employment, age and other personal facts to—**The Secretary, Kendall & Gent Limited, Victoria Works, Gorton, Manchester 18.**

BALDING ENGINEERING LTD.

have vacancy for design engineer; minimum technical qualification H.N.C.

This vacancy is caused by the promotion of our design engineer to works director.

The post calls for a young man of unquestionable ability, high personal integrity and enthusiasm who is determined to make a great success of the position offered. Fullest possible details together with commencing salary required in complete confidence to the Managing Director.

***Apply*: Balding Engineering Ltd., Norwich**

PRODUCTION SUPERVISOR

A highly qualified Production Engineer is required to assist the Production Manager of the Machine Tool Division of David Brown Industries Ltd. in Manchester. He will be concerned with all aspects of production of precision gear-cutting machines, ranging from the smaller type of general purpose gear hobbing and gear production machines, to the largest and heaviest gear-cutting machines made.

Suitable applicants will have held a similar position for a minimum of five years and will be conversant with all aspects of machine tool manufacture. The preferred age group is 35–45 years. A recognised qualification in mechanical or production engineering will be considered a great advantage.

There are excellent prospects of advancement within the Company. Applications giving full details of the responsibilities of present and previous posts and relevant personal information (age, education, etc.) should be addressed to: The Director of Personnel at

DAVID BROWN INDUSTRIES LTD.

Park Works, Lockwood, Huddersfield

SENIOR TOOL-ROOM FOREMAN

Man 35/40 years, able to control every aspect of Tool-Room production as related to small batch high precision work. Must have proved experience as successful foreman. Preference will be given to man with thorough knowledge of estimating, costing, planning, and modern Tool-Room methods. Only ambitious men with energy, drive and initiative should apply. Commencing salary £1,250, rising to £1,500 per annum on achievements. Well-known Company near centre Birmingham. Write giving full particulars :

BOX C 532, MACHINERY, Clifton House, Euston Road, N.W.1

Several vacancies exist on the Senior staff of:—

NORTH WEST MACHINE DESIGN CO. LTD.

for men of H.N.C. quality and above, who have specialised in—

SPECIAL PURPOSE MACHINES

SPECIAL PURPOSE MACHINE TOOL DESIGN

and are capable of using others to produce production drawings in these fields.

These positions offer excellent opportunities to competent men who are prepared to accept responsibility.

Excellent salary, superannuation scheme, 3 weeks' holiday after qualifying period. 3 premium days, excellent working conditions.

Apply by telephone or in writing to the

Drawing Office Manager,
177, Kenton Road,
Kenton, Harrow, Middx.
Tel.: WORdsworth 0301.

Young Man Required, Having completed the Junior Technical School day course in Engineering to train as a Draughtsman, particularly in connection with press tool work. Give details of education and experience to date, if any.—BOX C486, MACHINERY, Clifton House, Euston Road, N.W.1.

Planning Engineer. Applicants should also have had several years' experience cam and tool design on (S/S) Tarex and/or Index Autos. Excellent salary to man with proved experience. Mitcham/Morden area.—Apply in writing, stating age, experience and technical qualifications to BOX C522, MACHINERY, Clifton House, Euston Road, N.W.1.

Inspector Required by Mechanical Engineers. Must be fully experienced on inspection of hydraulic equipment. This is an additional Staff Appointment.—Apply CHAMBERLAIN INDUSTRIES, LTD., Argall Avenue, Leyton, E.10, or 'phone Mr. Clover, LEY 3678.

Press Tool Designer/Draughtsmen for advanced progression tools. London Trade Toolmakers. Salary, £900 per year.—BOX C574, MACHINERY, Clifton House, Euston Road, N.W.1.

Draughtsman Designer with experience of PRESSURE DIE CASTING MOULDS required for work including development projects in modern Drawing Office of old-established and expanding Company in North London. Permanent monthly staff appointment. Substantial salary to a fully qualified man. Pension scheme and assistance given with home removal.—Apply in confidence, giving details of education, experience, present position and salary, to PERSONNEL MANAGER, BRITISH OXYGEN COMPANY LTD., Sparklets Works, Queen Street, London, N.17. TOTenham 0881.

Planner Required by Mechanical Engineers. Practical Machine Shop experience essential.—Apply CHAMBERLAIN INDUSTRIES, LTD., Argall Avenue, Leyton, E.10, or 'phone Mr. Fage, LEY 3678.

Jig and Tool Designer. Applicants should have had several years' experience jig and tool design for capstans, mills and drills and have some knowledge of planning and estimating for the above machines. Mitcham/Morden area.—Apply in writing, stating age, experience and technical qualifications to BOX C524, MACHINERY, Clifton House, Euston Road, N.W.1.

Machine Tool Sales Engineer and Correspondent required.—Please write stating age, experience and salary required, to the MANAGER, BUCK & HICKMAN LTD., Otterspool Way, Watford By Pass, Watford, Herts.

Technical Correspondent Required to deal with correspondence and quotations in connection with sales of Machine Tools. Necessary qualifications to include some Machine Tool background and commercial experience. Applicant should be prepared to use initiative and take responsibility.—Apply: ELGAR MACHINE TOOL CO., LTD., 172-178, Victoria Road, London, W.3.

REPRESENTATIVES

Freelance Agents Required to cover exclusive territories in the United Kingdom for the sale of High Precision Machine Tools and Instruments. Good technical background and ability to work on own initiative essential.—BOX C556, MACHINERY, Clifton House, Euston Road, N.W.1.

SITUATIONS WANTED

Executive Engineer (36) Desires change, good organiser, administrator, etc. Indentured toolmaker, plus 4 years workshop, 5 years mechanical, jig and tool design, planning, estimating, production engineering. Qualifications H.N.C. Five years Technical Manager. Present location South Coast.—BOX C539, MACHINERY, Clifton House, Euston Road, N.W.1.

Factory Manager, 15 Years' executive experience, sound practical engineer, conversant with all aspects of Office and Works administration, customer liaison, Buying, Estimating, Planning, Production Engineering; used to full responsibility, seeks interesting appointment with progressive Company.—BOX C491, MACHINERY, Clifton House, Euston Road, N.W.1.

Chief Inspector, A.I.D., A.R.B. Approved 18 years. Several years' experience production, Tools, Planning, Estimating, General Machine Shop technique. 30 miles radius Southampton.—BOX C503, MACHINERY, Clifton House, Euston Road, N.W.1.

Production Engineer, Experienced in cost reduction for mass production of components and assemblies. Will accept contract at retainer fee plus percentage of savings. Resident London. Please indicate product and output.—BOX C576, MACHINERY, Clifton House, Euston Road, N.W.1.

Continental Born Young Man (26) at present design draughtsman, 11 years' practical and administrative experience seeks responsible post, £900 min. Can offer hard work and initiative.—BOX C583, MACHINERY, Clifton House, Euston Road, N.W.1.

Works Manager, Age 41, Seeks position of interest and responsibility, 26 years' light engineering experience in all departments. Expert on automatics.—BOX C584, MACHINERY, Clifton House, Euston Road, N.W.1.

RECEIVED TOO LATE FOR CLASSIFICATION

PLANT WANTED

WANTED

Single Spindle Automatics
Cleveland or Acme Gridley
$2\frac{1}{2}$in., $3\frac{1}{2}$in., $4\frac{1}{2}$in.

Box C 566, Machinery,
Clifton House, Euston Rd., N.W.1

Secondhand S.S. & S.C. Lathe to admit 25ft. between centres and swing 30in. over the saddle.—BOX C580, MACHINERY, Clifton House, Euston Road, N.W.1.

Edgwick No. 2 Simplimill, Preci-MAX 5 × 18 Cylindrical Grinder, No. 1 SCRIVENER Centreless Grinder, MATRIX Thread Grinders Nos. 10, 16U and 33.—Brief details and price to BOX C581, MACHINERY, Clifton House, Euston Road, N.W.1.

Lawson, 51 High Road, Swaythling, Southampton.

Automatic Cold Saw Sharpening Machine 24in.

Automatic Guillotine Sharpening Machine 4-6ft.

Automatic Wood Saw Sharpening Machine, 36in.

Good 40-50 Ton Geared Press with Double Roll Feed, 3in. adjustable stroke preferred. Also 10-12 ton Hydraulic Press.

WESTCOURT TOOL & STAMPING CO., LTD.
1, River Street, Brompton.
Gillingham, Kent.

•WORK TO PLACE•

Capstan (Chucking) Capacity Required. Large quantities.—Write BOX C578, MACHINERY, Clifton House, Euston Road, N.W.1.

••• DESIGNS •••

COST REDUCTION.

Estimating, Process Planning and Tool Design by experienced men at reasonable rates.—J. P. OATES & PARTNERS, 449A, North Circular Road, N.W.10. Dollis Hill 5700.

INDEX TO ADVERTISERS

(Continued on page 170)

INDEX TO ADVERTISERS—*(continued from page 169)*

1961

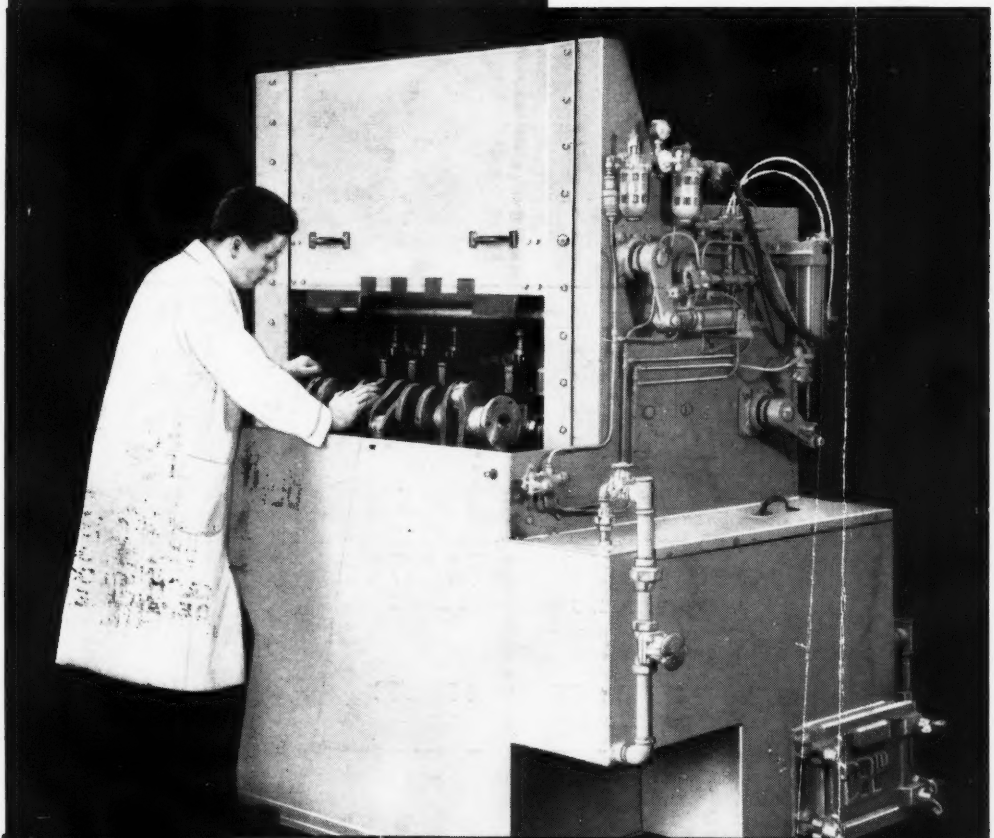
Published by THE MACHINERY PUBLISHING CO., LTD., at their Office, Clifton House, 83-117, Euston Rd., London, N.W.1. Telephone Euston 8441.
LONDON: HARRISON & SONS, LTD., by Appointment to Her Majesty, The Queen, Printers, London, Hayes (Middx.) and High Wycombe.

New Dawson high precision crankshaft washing plant

This is a new cabinet type machine which Dawsons supply to wash all sizes and types of crankshafts. A pneumatically operated carrier lowers the crankshafts into the cleaning position where special jets in the form of upper and lower bearing caps having annular grooves in the internal diameter locate closely on the journals allowing the alkaline solution to be forced through the oilways in the journals and out through the crank pins. At the same time jet pipes above and below thoroughly wash the external surfaces of the shafts.

The machine illustrated handles up to 20 crankshafts per hour, and is also available as an "In-line" machine loading at one end and discharging at the other. "In-line" machines are available to handle up to 120 crankshafts per hour.

FULLY PROTECTED BY PATENTS



Dawson

METAL DEGREASING and PRE-TREATMENT PLANT

Sole Distributors
DRUMMOND - ASQUITH LTD.
King Edward House, New St., Birmingham
Tel. Midland 3431

Manufacturers: **DAWSON Bros. Ltd., Gomersal, Near Leeds** **Tel: Cleckheaton 3422 (7 lines)**

London Works: 406 Roding Lane South, Woodford Green, Essex Tel: Crescent 7777 (4 lines)

which
ypes of
carrier
eaning
f upper
rooves
on the
to be
als and
e time
ash the

crank-
as an
d and
nes are
fts per

am
431

lines)